Opinion Leader: Dr. Archambault and Dr Yves Gingras

The Decline of Canadian Science

By Dr Éric Archambault and Dr Yves Gingras

The recent Canadian fiasco at the Summer Olympics in Greece — and its explanation in terms of lack of long-term investments in sports — maybe a symptom of a more general trend of the decline of Canada in the 21st Century. Not unlike sports, science can only develop in the long term and therefore countries need a strong and sustained effort to maintain their place in the race towards discoveries and innovation.

Words are not sufficient to improve one's level of performance. For instance, the first target of the Canadian Innovation Strategy (*Achieving Excellence: Investing in People, Knowledge and Opportunity*) announced in 2000 stated that by 2010 Canada should rank "among the top five countries in the world in terms of research and development (R&D) performance". There are two major problems with such a target. The first is that the Strategy did not commit the government nor private firms to the huge investments that would be necessary to move from the 14th place in OECD in 1999 to a glorious 5th in 2010.

The Strategy dreamed that tripling R&D expenditures would do the trick without telling by whom and how this feat would come about. A second problem is that the Strategy neither considered the historical trends in Canadian investments and outputs in science and technology (S&T) nor that of competing countries. At the time the strategy was published, many analysts in the field of S&T policy thought the objective to be little more than wishful thinking as it did not take into account the fact that competitors do not stand still while we try to jump higher. Others are trying to jump higher too.

PREDICTING THE PLACE OF CANADA IN WORLD SCIENCE

In 1997, we produced a report that predicted that the Republic of Korea would overtake Canada in terms of patents granted in the US in 1997 (using series extending to 1993) and that the dynamic Asian country would overtake Canada in terms of scientific output (measured by publications count) in 2006 (using series extending to 1995)1. The first prediction was accurate to one year since Korea effectively overtook Canada in 1998 in terms of US patents.

Given the updated data used here, we now predict that the Republic of Korea will overtake Canada in terms of scientific output by 2008. But this country is not the only one to present a threat to the leading place of Canada in world science. The accompanying figure shows the trend in terms of publications of the countries that are the most likely to overtake Canada in the coming years.

China has already done so, overtaking Canada in terms of natural sciences and engineering papers in 2003. Our projections, based on an exponential fit for the last seven years, also indicate that Italy will probably overtake Canada in 2004-2005. As for Spain, it will probably overtake Canada in about 10 years, if the trends remain the same.

Canada ranked 7th throughout the 1980s in terms of publications and kept that position until the disappearance of the USSR in 1993. Thanks to this political revolution, Canada could boast a 6th position from 1993 until 2002. The rise of China and the sustained growth of Italian scientific output is bound to push Canada outside the G7 to 9th rank starting in 2004 or 2005. According to our prediction on the output of the Republic of Korea, Canada will probably occupy 10th rank before 2010, the targeted date of the Innovation Strategy. So, far from moving up the scale, it is likely that

Canada's standing and influence in world science will continue to loose ground to countries that are increasing their share of the world's scientific output.

The choices that Canada faces are either to observe passively its decline in world science or to maintain and even substantially increase its level of spending. The wisest choice seems to be for Canada to start being strategic and identifying priorities while simultaneously consolidating its scientific base. Indeed, an important wave of investments started in 1996 with the Canada Foundation for Innovation, Genome Canada and the Canada Research Chairs.

But it seems that some are now thinking it is time to switch from investment in providing a strong base for innovation to putting money into commercialization of results, as if one could do the second without continuously investing in the first. It is ineluctable that as other countries become wealthier and thus spend more on science and R&D generally, they will continue to grow and gain more importance than Canada.

Diminishing Canada's commitment to research excellence would have a deleterious effect and precipitate its decline. It is therefore essential to guarantee that at least the current levels of funding are maintained. Since we cannot hope to obtain gold medals in every discipline, it is also important to identify a small number of S&T fields where Canada has a competitive advantage and to strengthen our position in these areas.

A hard, realistic and learned examination of our place in world S&T is the only basis on which to define targets that can realistically be reached and a comprehensive strategy that will ensure that Canada does not become a marginal power in S&T.

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[1] www.science-metrix.com/eng/pdf/Rapport_Final_Coree.pdf