

## **5<sup>th</sup> Annual Canada-Korea Dialogue Series on the Hill**

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Thank you very much President Young-Hae Lee for that kind introduction. It is a pleasure and an honour to participate in this 5<sup>th</sup> Annual Canada-Korea Dialogue on the Hill in the presence of the Honourable Stephane Dion Minister of Foreign Affairs; his Excellency Daeshik Jo, Ambassador of the Republic of Korea, and Dr. Crowley of the Macdonald-Laurier Institute. This is a unique event and I would be remiss if I did not mention the many MP's and Senators who are present to take part in the dialogue.

This is a very auspicious time to have a dialogue on collaboration in Science, Technology, Innovation, and Strategic Partnership between Canada and Korea. Our countries signed a Free Trade Agreement in 2015 and negotiations on an STI pact were concluded in 2015. When an STI pact is signed and ratified, Canada and Korea will in principle have every incentive to work more closely together to create new market opportunities for firms through scientific excellence, creativity, technological innovation, and access to the highly qualified people in both countries who provide the imaginative ideas for new businesses.

But what are the strengths and weaknesses of the two countries in science and technology? Do we have complementary assets and are we well matched to collaborate effectively? Are our innovation ecosystems sufficiently aligned that what works in Korea will be successful in Canada and vice versa?

An analysis of trade between the two countries shows 2 way commerce totalling \$10.8 billion in 2013 with Canada's exports being largely non-renewable natural resources while Korea's exports to Canada are largely manufactured goods – cars, TV's, ICT products. This reflects the real difference in the economies – Korea has a strong knowledge and innovation based economy, Canada has a poor record for business innovation. Korea invests heavily in business R and D (BERD) with a BERD/GDP value of 3.3%, second only to Israel in the world rankings.

Canada in contrast has a miserable BERD/GDP of 0.82% (26<sup>th</sup> of 41 OECD countries). In fact Canada's BERD has been declining for many years and now ranks below Estonia.

Another notable feature of Korea's R and D investment landscape is that Government investment in Business R and D (a mix of direct and indirect (e.g. Tax credits for R and D support) rose to 0.42% of GDP in 2013, the highest in the world. Canada ranked 10<sup>th</sup> with 0.22% of GDP – and most of this was in indirect investment. This is one area where a Canada-Korea STI agreement could help Canada overcome its poor record for business innovation and take a page from the Korean book on how to incent innovation in business.

Turning now to overall investments (Business, Government, and Higher Education) in S and T, Canada again compares poorly with Korea. Indeed in 2013 Korea at 4.2% of GERD/GDP was second only to Israel having risen rapidly over the last two decades. Canada's overall GERD/GDP fell to 1.62% in 2013 from 1.96% in 2006 indicating a loss of competitiveness with most leading advanced countries.

For Canada the only bright spot in the R and D investment statistics is that its investment in Higher Education R and D (HERD) at 0.65% of GDP (unchanged from 2006) is 8<sup>th</sup> in the world, down 5 places from 2006 but still relatively strong. Korea does not fare so well here, with 0.38% of HERD/GDP.

To summarise, Korea is a global leader in overall Gross Expenditures on R and D, Business Expenditures on R and D, and Government Expenditures on Business R and D. We have lots to learn here!

Turning now to the output and impact of scientific publications, Canada's academic research strengths become evident. With 0.5% of the world's population, Canada accounted for 4.1% of global scientific papers in 2005-2010. This was 7<sup>th</sup> in the world. Canada really pulls above its weight here. In terms of citations (Average Relative Citations ARC) a measure of research impact, Canada ranked 6<sup>th</sup> in the world. In the same assessment Korea was 12<sup>th</sup> in the world between Australia and the Netherlands in terms of papers published and in their impact. Considering that the population of Canada is 36 million while the population of the Republic of Korea is 50 million (1.4 times Canada), Canada's scientific productivity is remarkable.

This brings me to the issue of scientific and technical collaboration – one of the principal reasons for an STI agreement. The word “collaboration” implies different things to many people. To illustrate here are a few quotes from famous individuals about collaboration:

Hellen Keller: the author and first deaf-blind person to earn a bachelor’s degree.

“Alone we can do so little, together we can do so much”.

“Collaboration divides the task and multiplies the success”.

Henry Ford:

“Coming together is a beginning, keeping together is progress, working together is success”.

Charles Darwin:

“Those who have learned to collaborate and improvise most effectively have prevailed”.

Richard J. Samuels, MIT:

“If you can’t pay attention to and assimilate technological information beyond your borders, you’re playing the game with one arm tied behind your back”.

For all of these reasons we should work to enhance collaboration under the new agreement between Canada and Korea. In fact, scientific research is increasingly a collaborative endeavour. Currently more than 35% of articles published in international scientific journals have authors from more than one country. In 2012 Canada had an overall collaboration rate of 45.2 meaning that 45.2% of Canada’s papers had at least one co-author from another country. Korea had a collaboration rate of 28% for the same year. It is also worth noting that Canada-S. Korea co-authorship on papers in NSE has seen the 5<sup>th</sup> largest percentage increase among 24 jurisdictions. It is also significant perhaps that Average Relative Citations (ARC’s) are significantly higher for papers co-authored with S. Koreans than the total ARC’s for all papers – across all universities – indicating higher scientific impact for joint Canada-Korea papers.

Finally an analysis of Collaboration Affinities between countries shows that those with a high “affinity” for publishing with Canadian researchers include: the US, Australia, China, Brazil, and South Korea. This is a good sign for future collaboration.

Of course research collaborations can also be initiated in response to public policy initiatives. Many programs in the EU require that applications include researchers from more than one country. This has encouraged considerable intra-European collaboration.

The combination of an STI pact together with a funding program specifically targeting S. Korea – such as the Canadian International Innovation Program (the old ISTPP) which could be implemented once the STI pact is ratified, will undoubtedly give a boost to scientific and industry collaboration. It would also help enormously if federal granting agencies such as NSERC and CIHR were to join forces with their Korea counterparts to fund joint collaborative projects between Canadian and Korean researchers.

Another initiative which would help boost the flow of students between Korea and Canada would be to open up the MITACS Globalink Program (Globalink Research Internships and Graduate Fellowships) to students from Korea. At present MITACS Globalink welcomes interns from India, Brazil, China, Mexico, and mostly recently France, Saudi Arabia, Turkey, and Vietnam, to Canada for a research internship. Korea would be a good partner country and its participation would undoubtedly stimulate greater mobility of undergraduate and graduate students to Canada.

With a Canada-Korea free trade deal now in force, many Canadian companies will benefit from preferential duty free access to the world’s 15<sup>th</sup> largest economy. Sectors that will quickly benefit significantly include seafood (70% duty free within 5 years), wine (15% tariff eliminated in 3 years), pulp, paper and wood products (all tariffs eliminated). Welcome as they are, these are largely products of our natural resources rather than industrial innovation.

Over the longer term, and I am convinced of this, arguably the greatest economic benefit to Canada will be learning from and collaborating with the world’s most innovative economy – South Korea. (Bloomberg announced in May 2016 that Korea ranks #1 in the world in innovation). With Canada’s abject business innovation performance, which continues to

deteriorate, we need to adapt quickly, to embrace the culture of innovation and risk taking so evident in Korea.

So what are the keys to success in building an innovative knowledge based economy as Korea has done so well? Here are some important factors identified by Bloomberg:

- i) Educate and hire young talent.

Korea's fast growth since the millennium has been driven by increasing its talented workforce with highly educated young people.

South Koreans view education as a catalyst for innovation. In fact, Korea invested 7.6% of its GDP into education in 2010 (compared to an average of 6.3% for the OECD countries) and 2.6% of GDP on post-secondary education (the OECD average is only 1.6%).

Learning is of course critical to the innovation process – to absorb new ideas and develop new skills.

- ii) Make innovation a high strategic priority and embed it into company culture.

South Korea's small and medium sized enterprises believe they can out-innovate large companies – a culture of fearless innovation has brought great success. Fully 92% of South Koreans believe SME's can out-innovate large companies. Fully 95% of South Koreans say innovation is a strategic priority.

This has also enabled them to stand up to tough competition.

- iii) Canada must try to encourage (incent) greater business investment in innovation by large and medium sized companies. Direct as opposed to indirect (tax credits) investments by government are needed.

Korea now sets the standard for Business Investment in R and D as #1 in the world. We must take this as an example to follow.

- iv) Embrace risk and ambition.

It has often been said that Canadian companies are risk averse. One expression of this is that Canadian companies aspire to be Canadian leaders – not global leader! Or as David Lloyd George, England's Prime Minister in the early 1900's said, and I quote: "Don't be afraid to take a big step if one is needed. You can't cross a chasm in two small jumps!".

Embracing risk and ambition is also relevant to our Venture Capital Industry in Canada which is often very conservative in its decisions to not invest in promising, creative companies.

To conclude, Canada and South Korea have complementary STI assets that will benefit our two countries. Canada has a strong and productive knowledge base ranking highly in global rankings of scientific productivity and impact. Our talent base is strong. We lead the OECD in the proportion of our population with a post-secondary education and our 15 year olds perform well in reading, math and science in the PISA tests. In fact Canada's PISA rankings were close to those of Korean 15-year olds. Among G8 countries Canada ranked second in mean science and mathematics scores, behind Japan. The number of PhD graduates in Canada grew significantly in 2012 and Canada and Korea have essentially the same number of PhD Science and Engineering Graduates per 100,000 population.

These comparisons are important because doctoral degrees are the creative talent that drive the application of new knowledge to economic growth and prosperity. Canada and Korea seem quite well matched here.

On innovation however Canada is far behind Korea in general, despite pockets of excellence, and we need to collaborate with Korea in taking our innovation capacity to a new level.