



Science-Matrix

Benchmarking of Canadian Genomics





Canada compared to the World in genomics

- The number of genomics papers indexed in the Web of Science (WOS) increased from about 43,000 in 1993 to 73,000 in 2007. The share of genomics papers was quite stable over this period (around 7.5% of indexed papers in the WOS).
- Canada published about 2,100 genomics papers in 1993, compared to 3,600 in 2007. Its share of the world output is quite stable at about 5%.
- Canada is well positioned in genomics. It ranks 6th in the world for number of papers, and 5th for production per capita and scientific impact (both observed [based on citation counts] and expected [based on journals' impact factor]).
- The only aspect for which Canada ranks lower (10th place) is the specialization index; the proportion of its papers in genomics is about the same as the world's proportion.
- Although it is not specialized, Canada has a noticeable production in the field, with papers that achieved high scientific impact; Canada's genomics papers received, on average, 15% more citations than world papers in this field and its impact increased over the 1996-2007 period.
- In a multicriteria ranking, Canada ranks 5th behind the US, Switzerland, the Netherlands, and the UK in the 1996-2007 period. In the 2005-2007 period it ranks 6th.



Canada compared to the World in GE³LS research

- About 2,500 of papers covered in the WOS for the 1996-2007 period were on GE³LS research.
- Canada is well positioned in GE³LS research. It ranks 3rd for its number of papers, 5th for its output per capita and its scientific impact (both observed [based on citation counts] and expected [based on journals' impact factor]) and 6th for its specialization.
- Contrary to its performance in genomics as a whole, Canada is specialized in GE³LS but did not receive, on average, more citations than world papers in this area.
- In a multicriteria ranking, Canada ranks in 4th place on a par with Australia behind the UK, the US and Denmark.
- The scientometric analysis of genomics and GE³LS research reveal that Canada is an important producer of scientific output in genomics at the international level, and that its production standards are high.
- Since Canada will not be able to compete with larger and rapidly developing countries in terms of quantity of output in the long run, it would be judicious for Canada to prioritize excellence (i.e., scientific impact).



Genome Canada's contribution to Canada's output

- The papers produced by researchers funded by Genome Canada had significantly higher observed and expected scientific impacts than other genomics papers from Canada and the world. This suggests that Genome Canada successfully selected outstanding researchers.
- In testing the effect of Genome Canada funding on the scientific impact of research, it was found that papers authored with financial support had significantly higher impact than non supported papers. However, this difference is modest and can be attributed to a small percentage of high impact papers.
- In fact, the scientific impact of individual researchers before and during the period of support by Genome Canada was not statistically significant. As such only a fraction of the supported researchers contributed to the higher impact of supported versus non supported papers.
- Among the high-impact papers are success stories that would likely not have been accomplished had Genome Canada not been created.
- The substantial financial resources made available through Genome Canada for funding large scale genomics projects appear to have been a factor in attracting outstanding scientists to Canada.
- It is not surprising that funding the best researchers produces great results, but it does not fuel the achievement of astonishingly greater scientific excellence.



Canada compared to the World in patenting genomics

- Canada owned 2.2% (about 25) of genomics patents issued by the USPTO in 1993, it owned 3.3% (about 150) of these patents in 2007.
- Canada has been an important player in the acquisition of intellectual property rights on genomics inventions between 1996 and 2007. With Japan, Germany, the UK, and France, Canada is one of the foremost producers of genomics-related intellectual property (IP), as measured by patents granted by the USPTO.
- Canada is specialized in the technological aspect of genomics (3rd place); its proportion of USPTO patents in this field being 65% higher than the overall proportion of genomics patents in the USPTO database.
- Canada ranked 3rd for its number of patents per capita and 2nd for its average of relative citations .
- Overall, Canada has proven to be a strong performer, ranking 2nd behind the US in the multicriteria benchmarking.
- Canada's performance has been strongest in the most recent three-year period (2005-2007). In fact, Canada joined the US in 1st place in this period as a result of an increase in its number of patents and its average of relative citations .