From:
OECD Science, Technology and Industry Outlook 2014

Access the complete publication at:
http://dx.doi.org/10.1787/sti_outlook-2014-en

Canada

Please cite this chapter as:

OECD (2014), "Canada", in *OECD Science, Technology and Industry Outlook 2014*, OECD Publishing.
http://dx.doi.org/10.1787/sti_outlook-2014-40-en

CANADA

Canada is the world's ninth largest economy, and its export-led growth is projected to strengthen in 2014-15. The STI system is well developed, though weaknesses and challenges remain.

Hot issue 1: Encouraging innovation in firms and supporting entrepreneurship and SMEs. Canadian BERD decreased steadily from 1.26% of GDP in 2001 to 0.88% in 2012, well below the OECD median (Panel 1[d]). This occurred despite the generous Scientific Research and Experimental Development (SR&ED) tax incentive, which amounted to USD 2.7 billion (CAD 3.3 billion) in 2012 and to 80% of overall public support for business R&D. New measures have been announced to streamline and improve the predictability and enforcement of the SR&ED tax incentive programme. Owing to the importance of natural resources industries in the economy, large firms account for a smaller share of Canadian BERD than the OECD average (Panel 2) and Canadian firms fall below the OECD median in terms of top 500 corporate R&D investors (Panel 1[e]). The 2013 federal budget introduced new measures to promote business innovation: USD 325 million (CAD 400 million) to support a Venture Capital Action Plan over the next seven to ten years; USD 98.4 million (CAD 121 million) over two years through the National Research Council to help the growth of innovative businesses; USD 48.8 million (CAD 60 million) over five years to help outstanding, high-potential incubator and accelerator organisations expand their services to entrepreneurs, with an additional USD 32.5 million (CAD 40 million) provided to the Canada Accelerator and Incubator Programme in the 2014 budget; USD 81.3 million (CAD 100 million) through the Business Development Bank of Canada to invest in firms graduating from business accelerators; USD 16 million (CAD 20 million) over three years for the Business Innovation Access Programme (an innovation voucher programme); and USD 15 million (CAD 18 million) over two years to the Canadian Youth Business Foundation to help young entrepreneurs grow their firms.

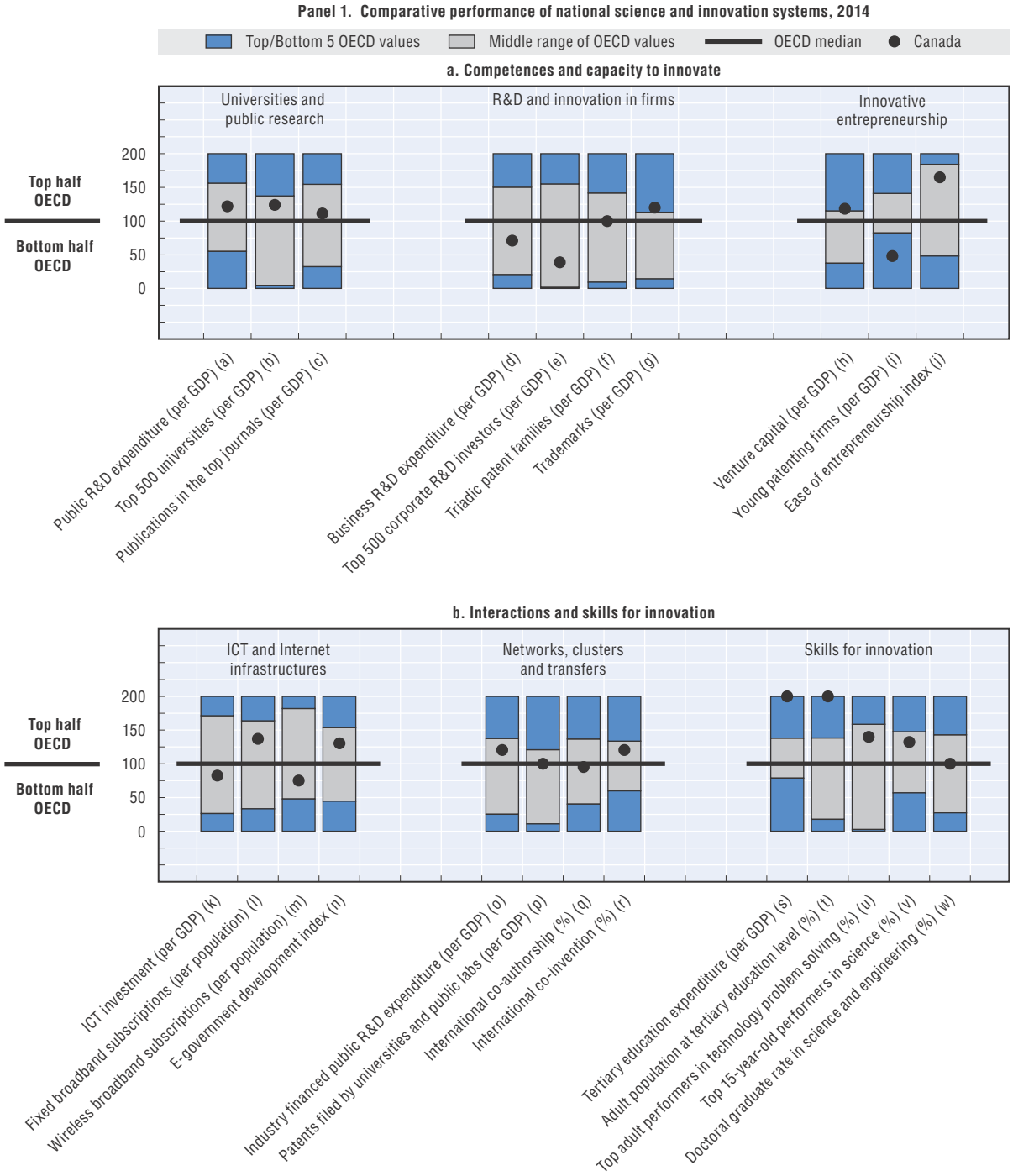
Hot issue 2: Strengthening R&D capacity and infrastructure. Canada has a strong university-centred research system (Panel 4), which performs above the OECD average (Panel 1[a, b, c]), and has a healthy link to industry funding (Panel 1[o]). The 2014 budget proposes to create the Canada First Research Excellence Fund with an additional USD 1.2 billion (CAD 1.5 billion) to advance Canada's global research leadership over the next decade. New and on-going initiatives to support industry-science linkages include: new funding of USD 30 million (CAD 37 million) in 2013-14 and on-going funding through the federal research granting councils for partnered research. The Canada Foundation for Innovation (CFI) received USD 403 million (CAD 500 million) in the 2012 budget to sustain its core investment in modern research infrastructures. A further USD 183 million (CAD 225 million) was allocated to CFI in the 2013 budget to enrich the next Leading Edge/New Initiatives Fund competition, to support cyber-infrastructure, etc. In keeping with global trends on open access, the Natural Sciences and Engineering Research Council and the Social Sciences and Humanities Research Council are considering a policy that would require federally funded peer-reviewed journal publications to be made freely available within one year of publication, as is currently the case for research funded by the Canadian Institutes of Health Research.

Hot issue 3: Targeting priority areas/sectors. Canada has a strong RTA in the three technological areas covered in Panel 3, but its RTA in environment-related technologies decreased in past years. To support the development and demonstration of new, clean technologies, the government appropriated USD 264 million (CAD 325 million) in its 2013 budget over eight years to Sustainable Development Technology Canada. Also in the 2013 budget, Canada's manufacturing and processing sector received USD 1.1 billion (CAD 1.4 billion) in tax relief for the 2014-18 period. The government will also provide stable funding of close to USD 813 million (CAD 1 billion) over five years for the permanent Strategic Aerospace and Defence Initiative, some of which is directed to an Aerospace Technology Demonstration Programme, in addition to new funding for the latter. On 7 February 2014, the framework for Canada's future in space was unveiled and will serve as a guide for Canada's strategic activities, including R&D, in space. In the 2014 budget, strategic investments in the automotive and forestry sector include: USD 406 million (CAD 500 million) in additional funding for the Automotive Innovation Fund over

Key figures, 2013

Economic and environmental performance	CAN	OECD	Gross domestic expenditure on R&D	CAN	OECD
Labour productivity			**GERD**		
GDP per hour worked, USD PPP, 2013	49.2	47.7	Million USD PPP, 2012	24 801	1 107 398
(annual growth rate, 2008-13)	(+0.8)	(+0.8)	As a % of total OECD, 2012	2.2	100
Green productivity			**GERD intensity and growth**		
GDP per unit of CO_2 emitted, USD, 2011	2.3	3.0	As a % of GDP, 2012	1.69	2.40
(annual growth rate, 2007-11)	(+1.4)	(+1.8)	(annual growth rate, 2007-12)	(-1.4)	(+2.0)
Green demand			**GERD publicly financed**		
NNI per unit of CO_2 emitted, USD, 2011	2.1	3.0	As a % of GDP, 2012	0.71	0.77
(annual growth rate, 2007-11)	(+0.7)	(+1.6)	(annual growth rate, 2007-12)	(+0.4)	(+2.8)

Figure 9.6. **Science and innovation in Canada**



Note: Normalised index of performance relative to the median values in the OECD area (Index median = 100).

the next two years and USD 73.5 million (CAD 90.4 million) over four years to renew the Investments in Forest Industry Transformation programme.

Highlights of the Canadian STI system

STI policy governance: The Canadian government will release an updated STI strategy in 2014. The new strategy draws on the results of a broad public consultation on three policy areas: business innovation; developing innovative and entrepreneurial people; and excellence in public and post-secondary R&D. In May 2013, the National Research Council (NRC) announced that it would become a national research and technology organisation inspired by the German Fraunhofer institutes. It was reorganised into three divisions: engineering, life sciences and emerging technologies and chose areas of strategic importance in which to stimulate business investments in critical R&D. The NRC also put in place a Concierge Service, a single access point for SMEs looking for innovation-related assistance.

New sources of growth: The NRC partnered with the provinces and the private sector to fund several research initiatives in 2013 and stimulate industrial R&D activity in key technologies: printable electronics: USD 33 million (CAD 40 million); industrial biomaterials: USD 44.7 million (CAD 55 million); the Algal Carbon Conversion Pilot Project: USD 15 million (CAD 19 million); and the Canadian Wheat Alliance: USD 79 million (CAD 97 million). A new Advanced Manufacturing Fund of USD 163 million (CAD 200 million) was announced in the 2013 budget.

New challenges: The government addresses the global health challenge through a contribution of USD 183 million (CAD 225 million) to Grand Challenges Canada (GCC) through 2016. USD 12 million (CAD 15 million) a year will support expansion of the Strategy for Patient-Oriented Research, the creation of the Canadian Consortium on Neurodegeneration in Ageing, and other health research priorities.

ICT and Internet infrastructure: In April 2014, the Canadian government released Digital Canada 150, a plan to take full advantage of the digital economy. It includes new investments to help SMEs adopt digital technologies and to provide digital companies with access to venture capital. It also promotes digital technologies and open data. The federal government is a primary funder of a number of organisations that are key stakeholders in the advanced digital research ecosystem: Compute Canada, a national platform of supercomputing resources; CANARIE, Canada's Advanced Network for Innovation and Research, which provides a "national backbone" high-speed network to meet the needs of researchers working with high volumes of complex data; and Canada's research granting councils, which fund academic research and research infrastructure and cover data collection, development, analysis (computing), storage and networking aspects of research; and universities across Canada.

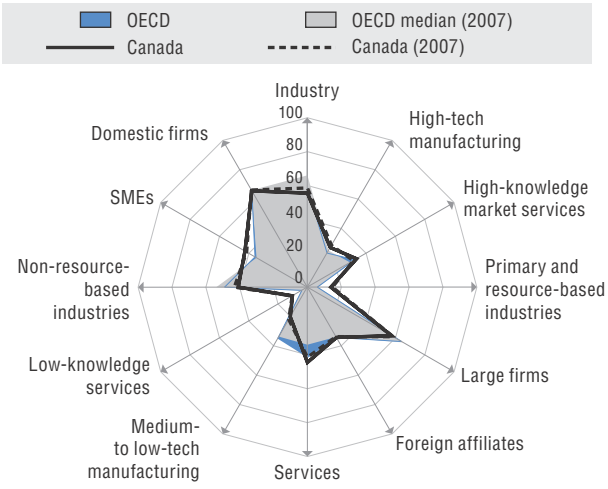
Clusters and smart specialisation: Over the next five years, to help Canada capture the commercial opportunities presented by open data, the Atlantic Canada Opportunities Agency will provide USD 366 million (CAD 450 million) to support innovation and commercialisation. The Federal Economic Development Agency for Southern Ontario will establish an Open Data Institute in Waterloo, Ontario. The Institute for Quantum Computing, at the University of Waterloo, is a leading Canadian research facility. It received USD 12 million (CAD 15 million) over three years, starting in 2014-15, to carry out and commercialise leading-edge research in quantum technologies. The 2014 government budget announced a total of USD 180 million (CAD 222 million) over five years for TRIUMF, Canada's premiere physics laboratory and home to the world's largest cyclotron particle accelerator in British Columbia.

Globalisation: In November 2013, Canada released a Global Markets Action Plan. A key objective is linkages to international business partners, international research, venture capital and entrepreneurial services that help high-potential Canadian businesses maximise access to opportunities. In January 2014, a new International Education Strategy was launched to maintain and enhance Canada's global position in higher education by attracting more international researchers and deepening research links between Canadian and foreign educational institutions. Several initiatives also facilitate the international mobility of the highly skilled and entrepreneurs.

Skills for innovation: Canada spends the highest share of GDP on higher education in the OECD area, and has a strong skills base in science and innovation (Panel 1[s, t, u, v]). The government has made strategic investments to strengthen S&E education, including information campaigns about fields of study, funding for internships in high-demand fields via the Career Focus programme, and enhanced support for First Nations and Inuit students.

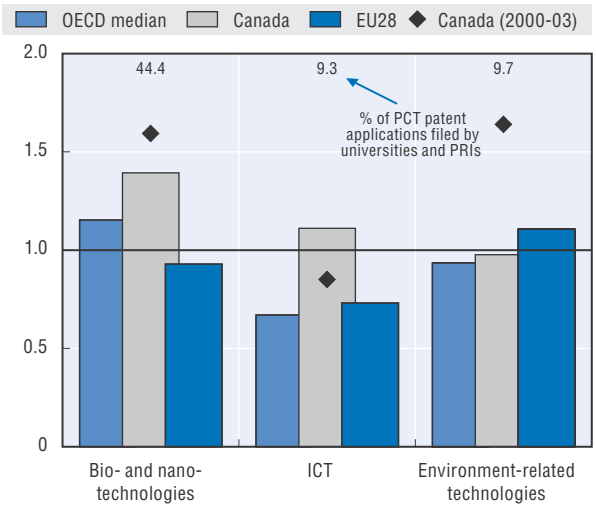
Panel 2. Structural composition of BERD, 2011

As a % of total BERD or sub-parts of BERD

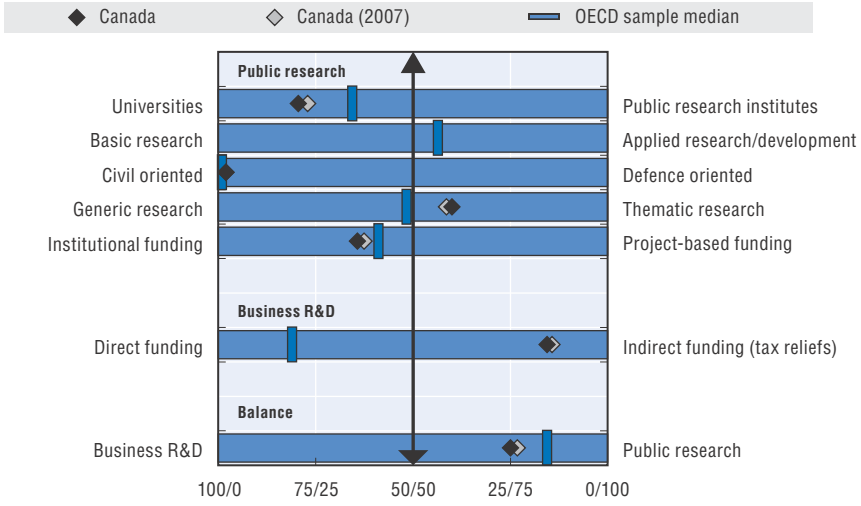


Panel 3. Revealed technology advantage in selected fields, 2009-11

Index based on PCT patent applications



Panel 4. Allocation of public funds to R&D, by sector, type and mode of funding, 2012



Note: Policy information comes from country responses to the OECD STI Outlook policy questionnaires 2014 and 2012. Canada's responses are available in the *OECD STI Outlook Policy Database*, edition 2014 at *http://qdd.oecd.org/Table.aspx?Query=72CBF532-BA6B-4BFC-90E9-02EBF397362D*.
Source: See reader's guide and methodological annex.

StatLink http://dx.doi.org/10.1787/888933152069

STI country profiles reader's guide

The country profiles (CPs) in the 2014 *OECD STI Outlook* (STIO) are designed to provide a concise overview of science, technology and innovation (STI) policy and performance in OECD members and selected non-OECD economies. Each country profile is based on information gathered from the country's response to the OECD STIO policy questionnaires 2012 and 2014, as well as various additional OECD and non-OECD sources.

Headings in the country profiles are linked to the STIO policy profiles, which examine the main global STI policy trends across countries. Issues featuring in both the policy and country profiles are: *i)* innovation policy governance; *ii)* new sources of growth; *iii)* new challenges; *iv)* universities and public research; *v)* innovation in firms; *vi)* innovative entrepreneurship; *vii)* technology transfer and commercialisation; *viii)* clusters and smart specialisation; *ix)* globalisation; and *x)* skills for innovation.

The table of key figures presents indicators on the country's economic performance (labour productivity), environmental performance (green productivity and demand), the size of its R&D system as measured by gross domestic expenditure on R&D (GERD), the degree of public commitment to S&T as measured by the share of GERD that is publicly financed, and the changes in these indicators over the past five years. In the text, all amounts are given both in USD in purchasing power parities (PPP) of the relevant year (if available) and in national currencies.

Panel 1 contains a double figure that sheds light on the strengths and weaknesses of the country's STI performance. It uses indicators on the country's national innovation system and performance with respect to: universities and public research, business R&D and innovation, innovative entrepreneurship, information and communication technology (ICT) and Internet infrastructure, networks, clusters and transfers, and skills for innovation. The dot for each indicator positions the country relative to the OECD median and to the top and bottom five OECD countries. Non-OECD countries are also compared to the OECD benchmarks, and may fall out of the range indicated in the figure (e.g. below the lowest OECD country). All indicators are normalised (by GDP and population cohorts) to take account of the size of the economy and the relevant population cohorts, and are presented as indices (OECD median = 100) for benchmarking purposes.

Panel 2 shows the structural composition of business expenditure on R&D (BERD) in terms of performance of the main industry sectors, firm size and firms' national affiliation. It reflects the country's industry structure and its business innovation efforts. Panel 3 presents the country's revealed technological advantage (RTA), as measured by international patent applications filed under the Patent Cooperation Treaty (PCT) in three key technology fields (bio- and nano-technology, ICTs, and environment-related technologies). It also shows the number of patents filed by universities and public research institutions in these fields.

Panel 4 gives an overview of the country's policy mix for public R&D, i.e. the orientation and funding modes of public research. It also illustrates changes in the policy mix for R&D over the past five years. Finally, Panel 5, a new feature in STIO 2014, reflects the balance and relative importance of various government measures to support business R&D and innovation. It is based on the country's self-assessment in its reply to the OECD STIO 2014 policy questionnaire.

Further details on the methodology, data sources and descriptions of indicators used in the country profile are provided in Annex 9.A. Data, metadata as well as the original sources and databases of the indicators used in the STIO 2014 are accessible at the statistical portal IPP.Stat (cut-off date: 8 July 2014).

Abbreviations used in the country profiles

BERD: Business expenditure on research and development

EU: European Union

FDI: Foreign direct investment

GDP: Gross domestic product

GERD: Gross expenditure on research and development

HEIs: Higher education institutions

IPRs: Intellectual property rights

MNEs: Multinational enterprises

PRIs: Public research institutes

R&D: Research and development

S&E: Science and engineering

SSS: Smart specialisation strategy (also known as 3S)

STI: Science, technology and innovation

S&T: Science and technology

3S: See SSS

STEM: Science, technology, engineering and mathematics

USD: United States dollars
(converted using the purchasing power parities of the relevant year)

VC: Venture capital

Synthetic table

Table 9.1. **Comparative performance of national science and innovation systems, 2014**

Country relative position: in the top 5 OECD or above (★), in the middle range on par or above OECD median (▲), in the middle range below OECD median (Δ) and in the bottom 5 OECD or below (○)

		Competences and capacity to innovate									
		Universities and public research			R&D and innovation in firms				Innovative entrepreneurship		
		Public R&D expenditure (per GDP)	Top 500 universities (per GDP)	Publications in the top-quartile journals (per GDP)	Business R&D expenditure (per GDP)	Top 500 corporate R&D investors (per GDP)	Triadic patent families (per GDP)	Trademarks (per GDP)	Venture capital (per GDP)	Young patenting firms (per GDP)	Ease of entrepreneur-ship index
		PUB_XGDP	UNI500_GDP	PUB25_GDP	BE_XGDP	CORPRD500_GDP	PTRIAD_GDP	TRDMRK_GDP	VC_XGDP	PTYG_GDP	EASE_I
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Argentina	ARG	Δ	Δ	○	○	○	○	○			
Australia	AUS	▲	▲	▲	▲	Δ	Δ	▲	Δ		▲
Austria	AUT	▲	★	▲	▲	▲	▲	Δ	Δ	★	▲
Belgium	BEL	Δ	▲	▲	▲	Δ	▲	Δ	▲	Δ	Δ
Brazil	BRA		Δ	○		Δ	○	○			Δ
Canada	CAN	▲	▲	▲	Δ	Δ	▲	★	★	○	▲
Chile	CHL	○	Δ	○	○	○	○	Δ			Δ
China	CHN	Δ	Δ	○	▲	Δ	Δ	○			○
Colombia	COL	○	○	○	○						
Costa Rica	CRI	○	○	○	○	○					
Czech Republic	CZE	▲	Δ	Δ	Δ	Δ	Δ	Δ	○		Δ
Denmark	DNK	★	▲	★	▲	★	▲	▲	▲		▲
Estonia	EST	▲		▲	▲	○	Δ	Δ	▲		▲
Finland	FIN	★	★	▲	★	★	★	▲	★	★	▲
France	FRA	▲	Δ	Δ	▲	▲	▲	▲	▲	Δ	▲
Germany	DEU	★	▲	Δ	▲	▲	★	▲	▲	★	▲
Greece	GRC	○	Δ	Δ	○	Δ	○	○	○		Δ
Hungary	HUN	○	Δ	Δ	Δ	Δ	Δ	○	Δ		Δ
Iceland	ISL	★	○	★	▲	▲	Δ	★			Δ
India	IND	Δ	○	○	○	○	Δ	○			○
Indonesia	IDN		○	○	○		○	○			Δ
Ireland	IRL	Δ	▲	▲	Δ	▲	▲	▲	★	○	Δ
Israel	ISR	Δ	★	▲	★	▲	▲	▲	★		○
Italy	ITA	Δ	Δ	Δ	Δ	Δ	Δ	Δ	○	▲	★
Japan	JPN	▲	Δ	○	★	▲	★	Δ	Δ	○	▲
Korea	KOR	▲	Δ	Δ	★	▲	▲	▲	▲		Δ
Latvia	LVA	Δ	○	○	○		Δ				
Lithuania	LTU	Δ	○	○	○		Δ				
Luxembourg	LUX	○	○	Δ	Δ	★	▲	★	Δ		Δ
Malaysia	MYS	Δ	Δ	○	Δ	Δ					
Mexico	MEX	○	○	○	○	○	○	Δ			○
Netherlands	NLD	▲	▲	★	▲	▲	▲	▲	▲	▲	★
New Zealand	NZL	Δ	★	▲	Δ	Δ	Δ	★	Δ		★
Norway	NOR	▲	▲	Δ	Δ	▲	Δ	Δ	Δ	▲	Δ
Poland	POL	Δ	Δ	Δ	○	○	Δ	○	○		○
Portugal	PRT	Δ	▲	▲	Δ	Δ	Δ	Δ	Δ		▲
Russian Federation	RUS	Δ	○	○	Δ	Δ	○	○	Δ		Δ
Slovak Republic	SVK	Δ	○	○	○	○	○	○			★
Slovenia	SVN	Δ	▲	▲	▲	Δ	Δ	Δ	Δ		Δ
South Africa	ZAF	○	Δ	○	Δ	Δ	Δ	Δ	Δ		○
Spain	ESP	Δ	Δ	Δ	Δ	Δ	Δ	Δ	○	○	○
Sweden	SWE	★	★	★	★	★	★	▲	▲	★	Δ
Switzerland	CHE	▲	▲	★	▲	★	★	★	▲	★	▲
Turkey	TUR	Δ	○	○	Δ	Δ	○	○			○
United Kingdom	GBR	Δ	▲	▲	Δ	▲	▲	▲	▲	Δ	▲
United States	USA	▲	Δ	Δ	▲	▲	▲	▲	★	○	★
EU28	EU28	▲	▲	★	▲	Δ	▲	Δ	▲	▲	

Table 9.1. **Comparative performance of national science and innovation systems, 2014** *(cont.)*

Country relative position: in the top 5 OECD or above (★), in the middle range on par or above OECD median (▲), in the middle range below OECD median (Δ) and in the bottom 5 OECD or below (○)

		Interactions and skills for innovation												
		ICT and Internet infrastructures				Networks, clusters and transfers				Skills for innovation				
		ICT investment (per GDP)	Fixed broadband subscribers (per population)	Wireless broadband subscribers (per population)	E-government readiness index	Industry financed public R&D expenditure (per GDP)	Patents filed by universities and public labs (per GDP)	International co-authorship (%)	International co-invention (%)	Tertiary education expenditure (per GDP)	Adult population at tertiary education level (%)	Top adult performers in technology problem solving (%)	Top 15 year-old performers in science (%)	Doctoral graduate rate in science and engineering (%)
		ICTINV_XGDP	FBBAND_HAB	WBBAND_HAB	EGOV_I	PUB_BEF_XGDP	PATPRI_XGDP	INTCOA_XSA	COPAT_XPCT	TER_XGDP	ADTERPOP_XT	TOPAD_PST_XAD	TOP15_SCI_XT	PHDR_SCIENG_XCOH
		(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)	(w)
Argentina	ARG		○	○	○	○		Δ	★	▲	○		○	○
Australia	AUS	▲	Δ	★	▲	▲	▲	Δ	Δ	▲	▲	▲	★	▲
Austria	AUT	▲	Δ	▲	Δ	▲	Δ	★	▲	Δ	Δ	Δ	Δ	▲
Belgium	BEL	▲	▲	Δ	Δ	▲	▲	★	★	Δ	▲		▲	▲
Brazil	BRA		○	Δ	○		Δ	○	Δ	○	○		○	○
Canada	CAN	Δ	▲	Δ	▲	▲	▲	Δ	▲	★	★	▲	▲	▲
Chile	CHL		○	○	Δ	○	Δ	▲	Δ	★	○		○	○
China	CHN		○	○	○	▲	Δ	○	○		○			○
Colombia	COL		○	○	Δ			▲	Δ	★	Δ		○	
Costa Rica	CRI		○	○	○			★	★		Δ		○	
Czech Republic	CZE	Δ	Δ	Δ	○	Δ	Δ	Δ	▲	Δ	Δ	Δ	Δ	Δ
Denmark	DNK	★	★	★	★	Δ	★	▲	▲	▲	Δ	★	Δ	▲
Estonia	EST		Δ	▲	Δ	Δ		▲	★	▲	▲	○	★	Δ
Finland	FIN	Δ	▲	★	▲	★	▲	▲	Δ	★	▲	★	★	★
France	FRA	Δ	★	Δ	▲	Δ	★	▲	Δ	▲	Δ		▲	▲
Germany	DEU	Δ	▲	Δ	▲	★	▲	Δ	Δ	Δ	Δ	▲	▲	★
Greece	GRC	○	Δ	Δ	Δ	Δ	○	Δ	▲	▲	Δ		○	Δ
Hungary	HUN		Δ	○	Δ	▲	○	▲	▲	○	Δ		Δ	○
Iceland	ISL		▲	▲	Δ	★		★	▲	○	▲		Δ	Δ
India	IND		○	○	○		Δ	○	▲	○				
Indonesia	IDN		○	○	○			▲	★	○	○		○	○
Ireland	IRL	○	Δ	▲	Δ	○	★	▲	▲	▲	▲	○	▲	▲
Israel	ISR		Δ	Δ	▲	▲	★	Δ	Δ	▲	★		Δ	▲
Italy	ITA	Δ	Δ	Δ	Δ	○	Δ	Δ	○	○	○		Δ	Δ
Japan	JPN	★	▲	▲	▲	Δ	▲	○	○	▲	★	▲	★	Δ
Korea	KOR	▲	★	★	★	▲	★	○	○	★	★	○	▲	Δ
Latvia	LVA		Δ	Δ	Δ	▲		Δ	★	▲	Δ		○	Δ
Lithuania	LTU		Δ	○	Δ	★		Δ	Δ		▲		Δ	
Luxembourg	LUX	○	▲	▲	▲	Δ	Δ	★	★	○	▲		▲	
Malaysia	MYS		○	○	Δ			Δ	Δ	★	○		○	
Mexico	MEX	○	○	○	○	○	○	Δ	▲	Δ	○		○	○
Netherlands	NLD	▲	★	▲	★	★	▲	▲	Δ	▲	Δ	★	▲	Δ
New Zealand	NZL	★	▲	▲	▲	★	Δ	▲	Δ	▲	▲		★	▲
Norway	NOR		▲	▲	▲	▲	Δ	▲	Δ	▲	▲	★	Δ	▲
Poland	POL		○	▲	○	Δ	Δ	○	★	Δ	Δ	○	▲	○
Portugal	PRT	▲	Δ	○	Δ	○	Δ	▲	▲	Δ	○		○	Δ
Russian Federation	RUS		○	Δ	Δ	★	○	○	Δ	Δ	★		○	○
Slovak Republic	SVK	○	○	Δ	○	Δ		Δ	▲	○	Δ	○	Δ	▲
Slovenia	SVN	Δ	Δ	Δ	Δ	▲	Δ	Δ	Δ	Δ	Δ		▲	▲
South Africa	ZAF		○	○	○	Δ	Δ	Δ	Δ	○	○			○
Spain	ESP	Δ	Δ	Δ	Δ	▲	▲	Δ	Δ	Δ	Δ		Δ	Δ
Sweden	SWE	★	▲	★	▲	▲	○	▲	Δ	▲	▲	★	Δ	★
Switzerland	CHE	★	★	Δ	▲		▲	★	★	Δ	▲		▲	★
Turkey	TUR		○	○	○	▲	○	○	○	Δ	○		○	○
United Kingdom	GBR	▲	▲	▲	★	Δ	▲	Δ	▲	Δ	▲		▲	★
United States	USA	▲	▲	▲	★	Δ	▲	○	○	★	★	Δ	Δ	Δ
EU28	EU28	Δ	▲	▲		Δ	▲	▲	▲		Δ		Δ	▲

Note: Non-OECD countries are also compared to OECD countries and may therefore be out of range (e.g. lower than the lowest OECD country). They appear in this table with top five and bottom five OECD values

Israel: "The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law."

Source: See references and methodological annex of the OECD STI Outlook 2014 country profiles.

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