From:
OECD Science, Technology and Industry Outlook 2014

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

Japan

Please cite this chapter as:

OECD (2014), "Japan", in *OECD Science, Technology and Industry Outlook 2014*, OECD Publishing.
http://dx.doi.org/10.1787/sti_outlook-2014-59-en

JAPAN

After two decades of slow economic growth, Japan shows signs of renewed dynamism. It is the world's third largest economy in GDP terms after the United States and China, and with 3.35% of GDP dedicated to R&D it ranks among the world's most R&D-intensive countries. Growth prospects are clouded however by an ageing population, high national debt (over 230% of GDP), and the effects of the Great East Japan Earthquake. The 4th S&T Basic Plan (2011-16) promotes an issue-driven, integrated approach to innovation policy, to be created and promoted together with society. Priority is given to environment, energy, health and medical care, and social challenges. In 2013, Japan adopted a Comprehensive Strategy on Science, Technology and Innovation as a long-term vision and roadmap to Japan's ideal economic society.

Hot issue 1: Innovation to contribute to addressing social challenges (including inclusiveness). The Comprehensive Strategy provides a set of issue-oriented policies and measures for building a healthy and active ageing society and creating next-generation infrastructures. Japan seeks to turn its medical equipment industries into world leaders and to become a "health country" with world-class health and medical technology and improved medical supply. The Research Centre Network for Realisation of Regenerative Medicine was launched in 2013 to advance induced pluripotent stem cell research and clinical applications will begin soon. Japan also promotes preventive medicine and supportive nursing, in addition to medical treatment. The 2nd Basic Programme for Shokuiku Promotion encourages education on food and nutrition. New infrastructures that use cutting-edge technologies (e.g. information technologies) and integrated approaches (e.g. Smart Life Project) are being developed to meet the needs of an ageing population.

Hot issue 2: Improving the framework conditions for innovation (including competitiveness). Japan has recently reinforced the IP legislative framework and facilitated research and development. The Patent Law was amended in 2012 to enhance protection of licence agreements and provide appropriate protection for results of joint research activities. The Japan Patent Office (JPO) introduced in 2013 a system of "collective examination for IP portfolios" to grant rights on a cross-section basis in line with the timing of business expansion. The JPO also revised the examination guidelines in order to expand the allowable scope of unity of invention. The Department for Promotion of S&T was created in 2011 to make recommendations for the reform of the S&T system, and the Act of Strengthening R&D Capability and Efficient Promotion of R&D with Promotion of R&D System Reform (2008) was amended in 2013 to allow independent administrative agencies to contribute, including through IPR, to start-ups in order to encourage the commercialisation of R&D results.

Hot issue 3: Improving governance of the innovation system and policy. Japan faces two difficulties for better co-ordinating innovation policy. One is the need to bridge the gap between S&T and innovation components of the national innovation system. The other is the lack of co-ordination among the many ministries involved in STI policy making. To address these issues, the central role of the Council for Science and Technology Policy (CSTP) has been reinforced. The CSTP is the main forum for discussion, development and assessment of S&T policy. It is in charge of strengthening co-operation among ministries, changing silo governance structures and strengthening R&D activities at different research stages, including basic research. To this end, the Cross-Ministerial Strategic Innovation Promotion Programme has been allocated USD 494 million (JPY 51.7 billion) to reinforce the CSTP Secretariat's role in S&T budget formation, ministerial co-operation and evaluation.

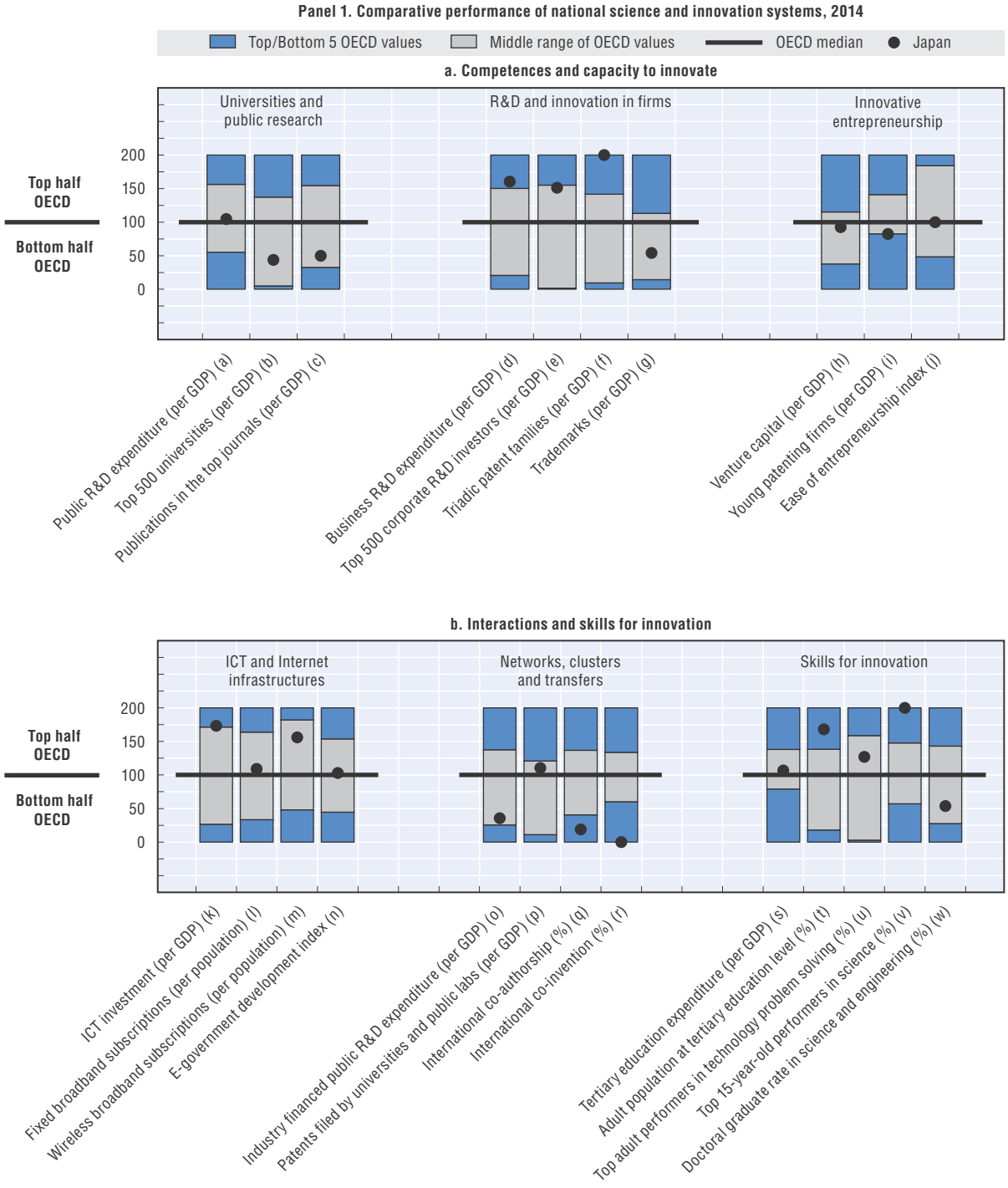
Highlights of the Japanese STI system

Universities and public research: Public R&D expenditure is modest (Panel 1[a]), especially in light of Japan's high GERD intensity. Applied R&D and experimental development absorb 50% of public R&D expenditures, and basic research about 30% of it. In terms of universities of global stature and high-impact publications, Japan is below the OECD median (Panel 1[b, c]). The 4th S&T Basic Plan aims to foster world-class basic research and emphasises the development and shared use of advanced research facilities as well as open data and open science infrastructures. The National Guidelines for Evaluating Government-Funded R&D were

Key figures, 2013

Economic and environmental performance	JPN	OECD	Gross domestic expenditure on R&D	JPN	OECD
Labour productivity			**GERD**		
GDP per hour worked, USD PPP, 2013	41.4	47.7	Million USD PPP, 2012	151 728	1 107 398
(annual growth rate, 2008-13)	(+0.9)	(+0.8)	As a % of total OECD, 2012	13.7	100
Green productivity			**GERD intensity and growth**		
GDP per unit of CO_2 emitted, USD, 2011	3.3	3.0	As a % of GDP, 2012	3.35	2.40
(annual growth rate, 2007-11)	(0.0)	(+1.8)	(annual growth rate, 2007-12)	(-0.9)	(+2.0)
Green demand			**GERD publicly financed**		
NNI per unit of CO_2 emitted, USD, 2011	3.0	3.0	As a % of GDP, 2011	0.75	0.77
(annual growth rate, 2007-11)	(0.0)	(+1.6)	(annual growth rate, 2007-11)	(-0.2)	(+2.8)

Figure 9.25. **Science and innovation in Japan**



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

revised in 2012 to reinforce the use of evaluation results in decision making regarding R&D programmes. Implementing agencies are also expected to make evaluation results public.

Innovation in firms: Japan's business sector is one of the world's most R&D-intensive (2.57% of GDP in 2012). The STI system is dominated by major corporate groups, which are among the world's largest corporate R&D investors (Panel 1[d, e]). Business investments in high-technology and medium-high-technology R&D (pharmaceuticals, communication equipment and motors vehicles) (Panel 2) have made Japan a world technology leader. Performance in non-technological innovation as measured by trademarks is modest (Panel 1[g]). Public support to the business sector is limited as firms finance 98% of their R&D activities. The R&D tax credit is the main public funding instrument.

Technology transfers and commercialisation: In Japan, innovation by large firms relies less on contracted public research (Panel 1[o]) and on co-operation with the science base than on innovation within the corporate group. As a consequence, researchers are highly mobile in the private sector but less so between industry and academia. A public-private consortium formed in 2014 encourages researchers' intersectoral mobility. The commercialisation of scientific research has been a priority of Japanese STI policy in recent decades, with a number of measures implemented since the mid-1990s. Through the new Centres of Innovation, the government subsidises high-risk collaborative R&D projects on social visions for the coming decade. If technology transfer through industry-science co-operation remains weak, universities and PRIs are active in patenting (Panel 1[p]). In 2012, Japan created the Programme for Creating Start-ups from Advanced Research and Technology (START) with USD 191 million (JPY 20 billion). START combines government funding and private-sector commercialisation know-how to support the launch of academic start-ups and leverage additional funding for public research.

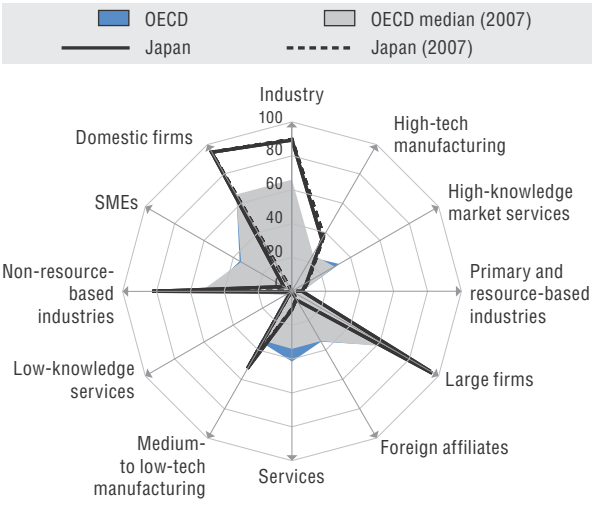
Clusters and smart specialisation: The Comprehensive STI Strategy and the Japan Revitalisation Strategy promote regional revitalisation by taking advantage of regional resources, developing regional infrastructures for innovation, particularly for transfer between universities and industry, and providing greater autonomy in the management of regional projects. Capitalising on prior cluster initiatives, Japan adopted a new Industrial Cluster Plan in 2014 with comprehensive initiatives to revitalise Japanese industry.

Globalisation: Japan remains weakly linked to international S&T co-operation networks (Panel 1[q, r]) and attracts few international R&D investments by firms (Panel 2). The Act for Promotion of Japan as an Asian Business Centre introduced corporate tax breaks, acceleration of patent examinations, reduction of patent fees, and shorter examination times for residence permits to encourage the establishment of foreign R&D centres and headquarters in Japan.

Skills for innovation: Japan has a sound skills foundation with a large pool of university graduates (Panel 1[t]) and high scores on international assessments of adults in technology problem-solving and of students in science (Panel 1[u, v]). However, there are relatively few doctoral graduates in science and engineering (Panel 1[w]) owing both to the low participation of youth (especially women) in doctoral programmes and to the lack of interest among youth in S&T studies. Japan has therefore sought to improve the attractiveness of research careers and to build a broader science culture. The 4th S&T Basic Plan aims to enhance support for doctoral students, improve the career paths of researchers, and promote the active involvement of female researchers. It also aims to raise interest in and awareness of science among youth and society by promoting S&T communication activities by researchers, various S&T-related activities at science and regular museums, and the population's S&T literacy.

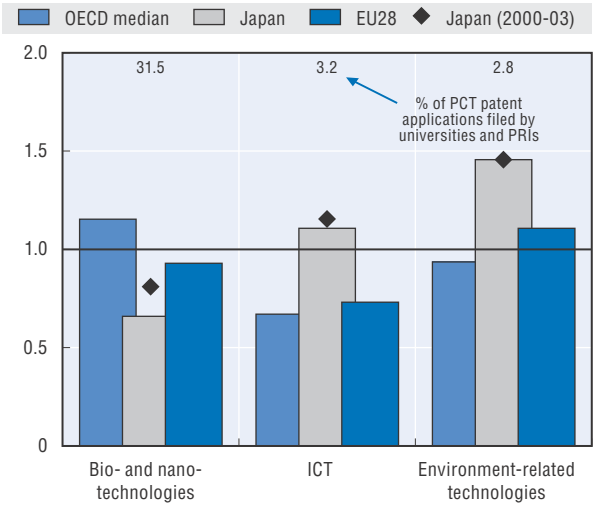
Panel 2. Structural composition of BERD, 2011

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

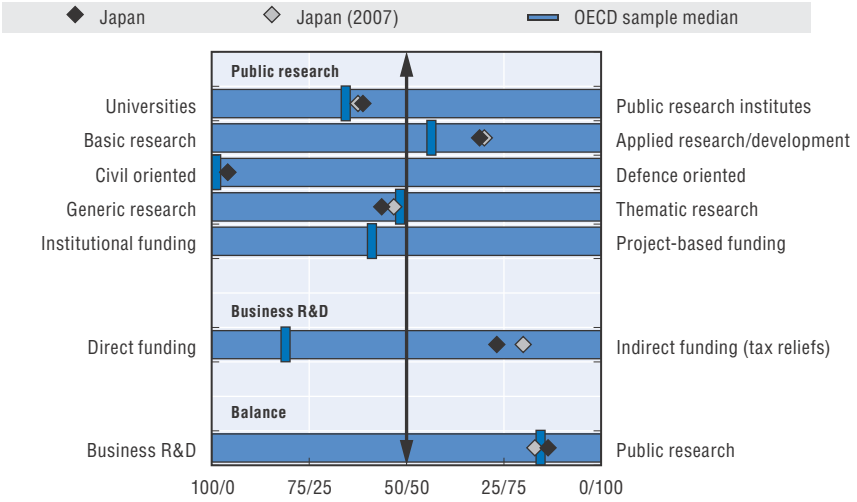


Panel 3. Revealed technology advantage in selected fields, 2009-11

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. Japan's responses are available in the *OECD STI Outlook Policy Database*, edition 2014 at *http://qdd.oecd.org/Table.aspx?Query=E699EE6C-62BB-45F2-942B-48BF9EE892F3*.
Source: See reader's guide and methodological annex.

StatLink http://dx.doi.org/10.1787/888933152256

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.

References

General references

European Commission (EC) (2013), *Monitoring Industrial Research: the 2013 EU Industrial R&D Investment Scoreboard*, European Commission, Luxembourg, *http://iri.jrc.ec.europa.eu/scoreboard13.html*.

International Energy Agency (IEA) (2013), *CO_2 Emissions from Fuel Consumption*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/co2_fuel-2013-en*.

Flanagan, K., E. Uyarra and M. Laranja (2010), "The policy mix for innovation: rethinking innovation policy in a multilevel, multi-actor context", *Munich Personal RePEc Archive* (MPRA) No. 23567, July 2010.

OECD (2010a), *OECD Science, Technology and Industry Outlook 2010*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264083479-en*.

OECD (2010b), "Monitoring innovation and policies: developing indicators for analysing the innovation policy mix", internal working document of the Directorate for Science, Technology and Industry (DSTI), OECD, Paris.

OECD (2010c), *Measuring Innovation: A New Perspective*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264059474-en*.

OECD (2010d), *SMEs, Entrepreneurship and Innovation*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264080355-en*.

OECD (2011), *Towards Green Growth: Monitoring Progress: OECD Indicators*, OECD Green Growth Studies, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264111356-en*.

OECD (2012), *OECD Internet Economy Outlook 2012*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264086463-en*.

OECD (2013a), *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/sti_scoreboard-2013-en*.

OECD (2013b), *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264204256-en*.

OECD (2014a), *OECD Economic Surveys*, OECD Publishing, Paris, *http://dx.doi.org/ 10.1787/16097513*.

OECD (2014b), *National Accounts at a Glance 2014*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/na_glance-2014-en*.

OECD (2014c), *Education at a Glance 2014: OECD Indicators*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eag-2014-en*.

OECD (2014d), *Entrepreneurship at a Glance 2014*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/entrepreneur_aag-2014-en*.

OECD (2014e), *Measuring the Digital Economy: A New Perspective*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/9789264221796-en*.

Van Steen, J. (2012), "Modes of public funding of R&D: Towards internationally comparable indicators", OECD *Science, Technology and Industry Working Papers*, No. 2012/4, OECD Publishing, Paris, *http://dx.doi.org/10.1787/5k98ssns1gzs-en*.

Databases and data sources

Academic Ranking of World Universities (ARWU) (2013), "Shanghai ranking" 2003-13, *www.shanghairanking.com*.

Bureau Van Dijk (2011), *ORBIS Database*, Bureau Van Dijk Electronic Publishing.

Elsevier B.V. (2014), *Elsevier Research Intelligence*, *www.elsevier.com/online-tools/research-intelligence/products-and-services/scival* (data retrieved online on 31 January 2014).

Eurostat (2014), *Education and Training (ETR) Databases*, June, *http://epp.eurostat.ec.europa.eu/portal/page/portal/education/data/database*.

Graham, S. et al. (2013), "The USPTO trademark case files dataset: Descriptions, lessons, and insights", *SSRN Working Paper*, *http://ssrn.com/abstract=2188621*.

International Energy Agency (IEA) (2013), *IEA CO_2 Emissions from Fuel Combustion Statistics*, *http://dx.doi.org/10.1787/co2-data-en*.

International Monetary Fund (IMF) (2014), *World Economic Outlook (WEO) Database*, April, *www.imf.org/external/pubs/ft/weo/2014/01/weodata/index.aspx*.

International Telecommunication Union (ITU) (2013), *World Telecommunication/ICT Indicators 2013*, *www.itu.int/pub/D-IND-WTID.OL*.

National Science Foundation (NSF) (2014), "Academic research and development", in *Science and Engineering Indicators 2014*, *www.nsf.gov/statistics/seind14/index.cfm*.

OECD (2012), *STructural ANalysis (STAN) Database*, November, *www.oecd.org/sti/stan*.

OECD (2013), *Activity of Multinational Enterprises (AMNE) Database*, October, *www.oecd.org/industry/ind/amne.htm*.

OECD (2013), *Green Growth Indicators Database*, *www.oecd.org/greengrowth/greengrowthindicators.htm*.

OECD (2013), "Modes of public funding of R&D: Interim results from the second round of data collection on GBAORD", internal working document of the Working Party of National Experts on Science and Technology Indicators (NESTI), OECD, Paris.

OECD (2013), *OECD/NESTI data collection on R&D tax incentives*, April, *www.oecd.org/sti/rd-tax-stats.htm*.

OECD (2013), "PISA: Programme for International Student Assessment", *OECD Education Statistics*, December, *www.pisa.oecd.org* and *http://dx.doi.org/10.1787/data-00365-en*.

OECD (2014), *Entrepreneurship Financing Database*.

OECD (2014), *Main Science and Technology Indicators (MSTI) Database*, June, *www.oecd.org/sti/msti*.

OECD (2014), *OECD ANBERD Database*, March, *www.oecd.org/sti/anberd*.

OECD (2014), *OECD Broadband Portal*, June, *www.oecd.org/sti/broadband/oecdbroadbandportal.htm*.

OECD (2014), *OECD Education Statistics*, June, *http://dx.doi.org/10.1787/edu-db-data-en*.

OECD (2014), *OECD Educational Attainment Database*, June.

OECD (2014), *OECD National Accounts Statistics*, April, *http://dx.doi.org/10.1787/naag-data-en*.

OECD (2014), *OECD Product Market Regulation Database*, March, *www.oecd.org/economy/pmr*.

OECD (2014), *OECD Productivity Database*, May, *www.oecd.org/std/productivity-stats*.

OECD (2014), *OECD Patent Database*, March, *www.oecd.org/sti/ipr-statistics*.

OECD (2014), *OECD Research and Development Statistics (RDS) Database*, March, *www.oecd.org/sti/rds*.

OECD (2014), *OECD Science, Technology and Industry Outlook Policy Database*, *http://qdd.oecd.org/subject.aspx?Subject=a2ebc2a0-b8dc-4d1a-82be-3fea780b86a6*.

UNESCO Institute for Statistics (UIS) (2014), *Education Database*, May, *http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS*.

UIS (2014), *Science, Technology and Innovation Database*, June 2014, *http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS*.

United Nations (UN) (2013), *UN e-Government Survey*, United Nations, NY, *http://unpan3.un.org/egovkb/Reports/UN-E-Government-Survey-2014*.

World Bank (WB) (2014), *World Development Indicators (WDI) Databank*, *http://wdi.worldbank.org*.