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## Finland

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## FINLAND

Finland is a northern European economy with an industrial structure dominated by high technology and medium-high technology. It has a strong and sustained technological specialisation in ICT (Panel 3). Overall, the Finnish STI system performs well by OECD standards. An Action Plan for Research and Innovation Policy (TINTO) has been implemented since December 2012 with a renewed focus on education and an emphasis on research and innovation at all levels.

**Hot issue 1: Improving the governance of the innovation system and policy.** In September 2013, the Finnish government adopted a Resolution on Comprehensive Reform of State Research Institutes and Research Funding, which focuses on building up multidisciplinary, high-level research of significant societal relevance and research in support of government decision making. The resolution covers reorganisation of PRIs, reallocation of some public research funding to competitive research funding, and creation of a new, strategic research funding instrument within the Academy of Finland to support long-term research on challenges facing Finnish society. The Team Finland Strategy published in June 2013 (see below), which is becoming an essential element of Finnish STI policy, will be updated annually but not continually reinvented, in order to maintain its long-term perspective and continuity. A first-ever evaluation of the Research and Innovation Council (RIC) was conducted to support the development and strengthening of the operation of the RIC. Its recommendations are under consideration by the government. The government is also carrying out the Central Administration Reform Project (KEHU) to improve co-ordination and coherence in government.

**Hot issue 2: Improving returns to and impact of science.** While Finland has a strong public research sector, universities and PRIs perform less well than those of other leading countries in filing for patents (Panel 1<sup>P</sup>). Until recently, Tekes, the Finnish funding agency for innovation, has emphasised research projects to address business needs. Recognising the importance of bringing entirely new businesses to life, Tekes has launched New Knowledge and Business from Research Ideas as a new type of funding for public research which allows scientists to explore an idea not only in the

research phase but also in terms of its transformation into new businesses through commercialisation.

**Hot issue 3: Innovation to contribute to sustainable/green growth.** In spring 2014 the government adopted strategies on cleantech and bio-economy. The goal is to accelerate growth, create new businesses and renew traditional industries through innovation. In June 2013, the government adopted a decision-in-principle on the promotion of sustainable environmental and energy solutions (cleantech solutions) through public procurement. This encourages the public sector to make creation and implementation of clean-technology solutions a reference for public procurement.

**Hot issue 4: Business innovation, entrepreneurship and SMEs.** Finland's BERD intensity is well above the OECD median (Panel 1<sup>d</sup>). BERD is primarily performed by the high-technology manufacturing sector and large firms such as Nokia (Panel 2). Overall patent applications and patenting by young firms rank at the top of the OECD mid-range (Panel 1<sup>f, i</sup>). To increase firms' R&D activity and create new high-value-added jobs, Finland introduced a fixed-term R&D tax incentive for 2013-14. Moreover, the Smart Procurement Programme (2013-16) aims to create new market opportunities for SMEs and produce ground-breaking innovative solutions to serve the needs of the Finnish public sector. In 2013 the government adopted an extensive growth funding programme (2014-17) for start-up and new innovative companies.

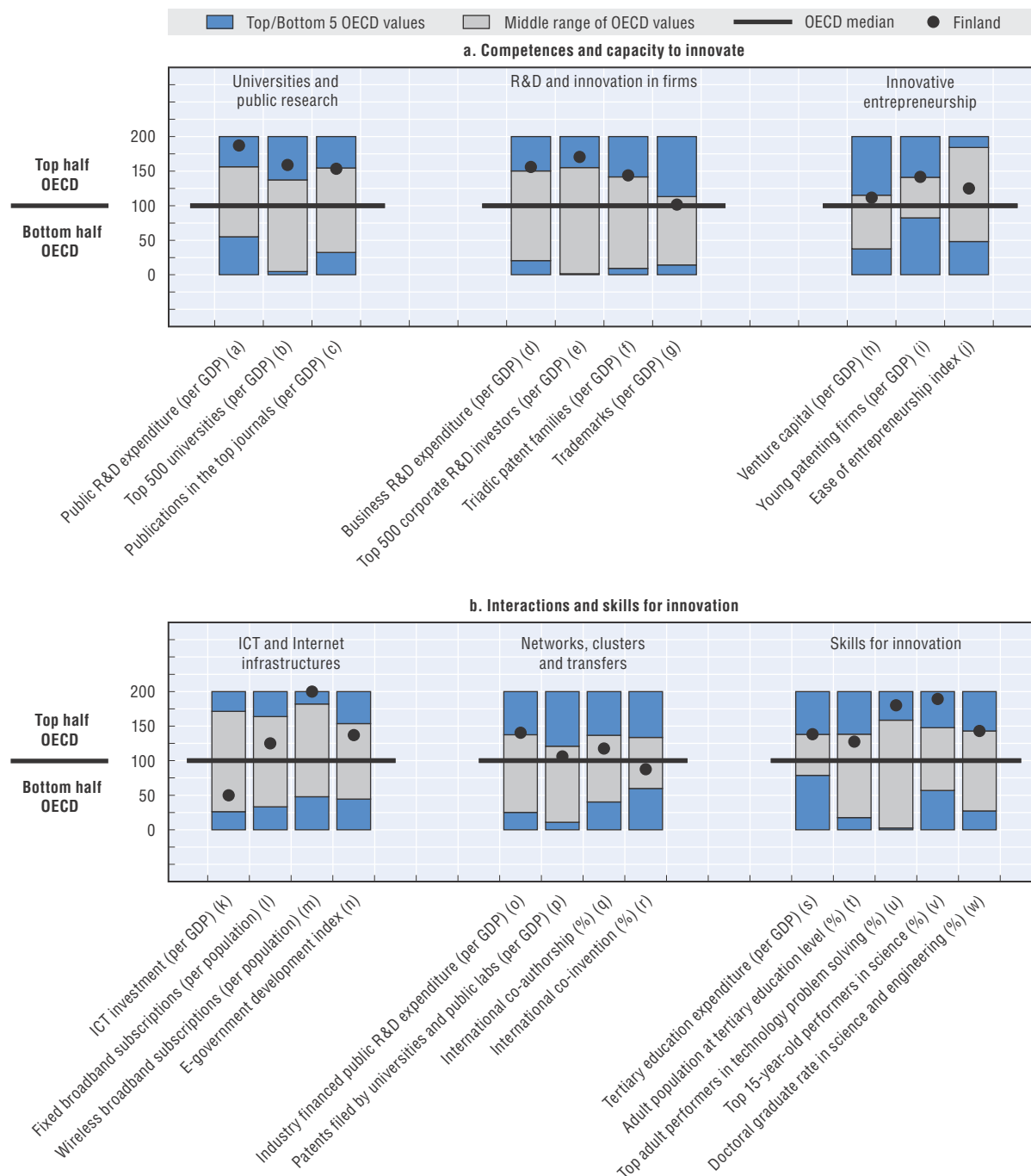
**Hot issue 5: Addressing the challenges of STI globalisation and increasing international co-operation.** With international co-publications above and international co-patenting below the OECD median, Finland's position in international co-operation on science and innovation is mixed (Panel 1<sup>g, j</sup>). To exceed the EU average in the stock of FDI as a share of GDP (46.6% in 2012) by 2020 from its current level (36% in 2012), the government adopted in December 2012 a decision-in-principle, Team Finland – Strategy for Promoting Foreign Investment. Rather than creating a new initiative or adding a new layer of bureaucracy, this strategy seeks to improve the efficiency of existing FDI promotion efforts by bringing them under a single umbrella. By doing so, the

### Key figures, 2013

Economic and environmental performance	FIN	OECD	Gross domestic expenditure on R&D	FIN	OECD
<b>Labour productivity</b>			<b>GERD</b>		
GDP per hour worked, USD PPP, 2013	51.3	47.7	Million USD PPP, 2012	7 530	1 107 398
(annual growth rate, 2008-13)	(-0.3)	(+0.8)	As a % of total OECD, 2012	0.7	100
<b>Green productivity</b>			<b>GERD intensity and growth</b>		
GDP per unit of CO <sub>2</sub> emitted, USD, 2011	3.1	3.0	As a % of GDP, 2012	3.55	2.40
(annual growth rate, 2007-11)	(+4.6)	(+1.8)	(annual growth rate, 2007-12)	(-0.3)	(+2.0)
<b>Green demand</b>			<b>GERD publicly financed</b>		
NNI per unit of CO <sub>2</sub> emitted, USD, 2011	3.1	3.0	As a % of GDP, 2012	0.95	0.77
(annual growth rate, 2007-11)	(+4.0)	(+1.6)	(annual growth rate, 2007-12)	(+1.7)	(+2.8)

Figure 9.14. Science and innovation in Finland

Panel 1. Comparative performance of national science and innovation systems, 2014



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

government wishes to create a clear, flexible and customer-oriented model so that key actors at home and abroad work towards a coherent strategic goal. In addition, international companies conducting R&D activities in Finland can apply for Tekes' funding even without being registered in Finland or having a Finnish partner.

### Highlights of the Finnish STI system

**New challenges:** The Strategic Centres for Science, Technology and Innovation (SHOK) are public-private partnerships for innovation to meet the needs of Finnish industry and society in the next five to ten years. They focus on energy, environment, bioeconomy, health and well-being, ICT, and metal products and mechanical engineering. SHOK activities are being developed on the basis of the international evaluation of SHOKs in 2013.

**Universities and public research:** Finland has a strong science base, high public expenditure on R&D, highly ranked universities and a high rate of scientific publications relative to GDP (Panel 1<sup>a, b, c</sup>). According to the Resolution on Comprehensive Reform, PRIs will be reformed. A new funding model for universities was introduced in 2013, with greater emphasis on quality, effectiveness and internationalisation, and strategic funding to support universities' profiles and their diversity has been increased. The new funding model will be reviewed in 2015. A new Polytechnics Act is to take force from the beginning of 2014 to help polytechnics to meet changes and challenges in Finnish workplaces and society by shifting responsibility for their basic funding to the state and by granting them the status of independent legal persons.

**Innovative entrepreneurship:** The Finnish government's venture capital activities for start-up funds will be transferred from Finnvera to Tekes from July 2014, with an annual bud-

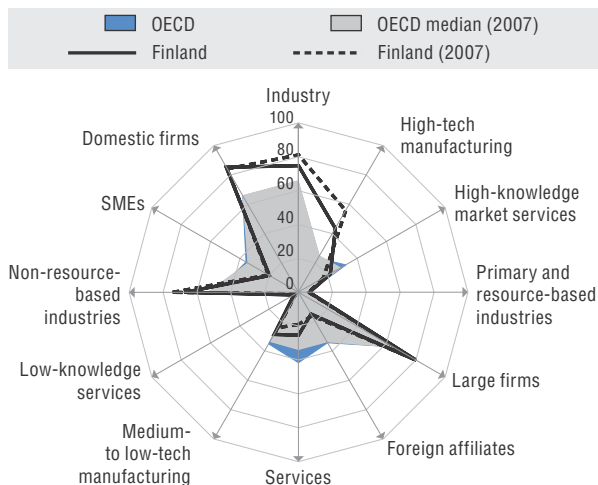
get of USD 22 million (EUR 20 million) and hopes of leveraging at least an equivalent amount from private VC sources. The Funding Scheme for Young Innovative Companies is intended to run in its current form until the end of 2014 and is then expected to continue in a modified form.

**Clusters and smart specialisation:** From 2014 the Centre of Expertise Programme (OSKE 1994-2013) will be replaced by INKA, the Innovative Cities Programme (2014-20). The programme has selected 12 urban regions in which to create and strengthen internationally attractive innovation clusters. The Witty City Programme (2013-17) supports collaborative projects between business, municipalities and research organisations to provide companies with opportunities to bring new products and services to the market. The new INKA programme has incorporated the EU smart specialisation concept. A synchronised national and regional innovation strategy was updated in 2013 when city regions organised large-scale planning in order to participate in INKA.

**Skills for innovation:** All human capital indicators for Finland are above the OECD medians (Panel 1<sup>t, u, v, w</sup>). Adults' ability to solve technical problems and 15-year-olds' performance in science are outstanding, and the high rate of doctoral graduates in science and engineering indicates a secure supply of the highly skilled for STI. The government's Action Plan for Gender Equality 2012-15 promotes equality between women and men and combats gender-based discrimination in education. The Ministry of Education and Culture uses several measures to make research careers attractive and aims at 1 600 doctoral graduates a year over 2013-16. A national working group of the Science Education Programme 2013-14 will review overall science education with a view to stimulating more interest in science and research among children and adolescents.

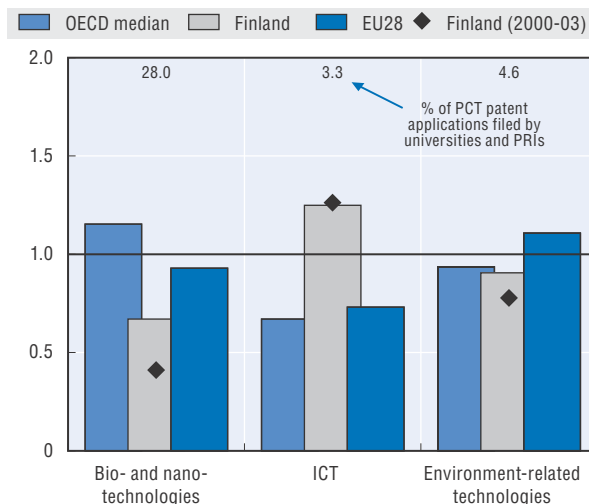
**Panel 2. Structural composition of BERD, 2011**

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

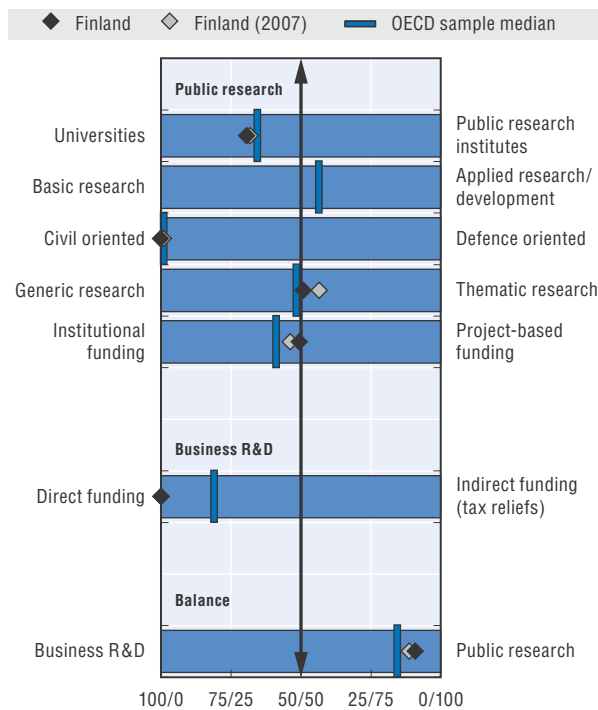


**Panel 3. Revealed technology advantage in selected fields, 2009-11**

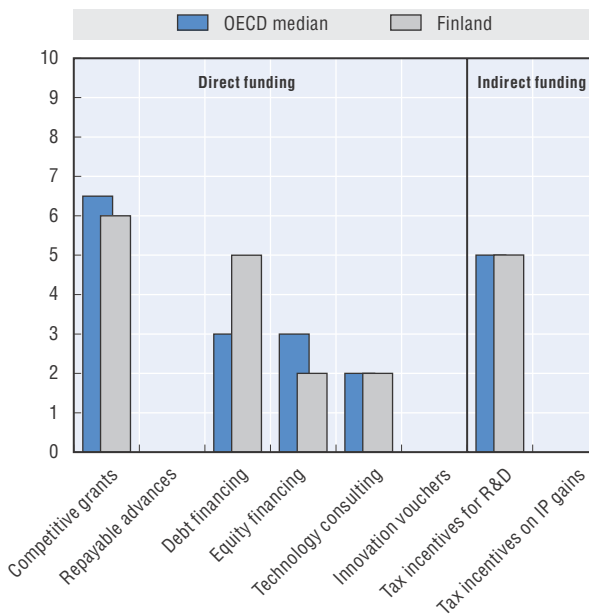
Index based on PCT patent applications



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



**Panel 5. Most relevant instruments of public funding of business R&D, 2014**



Note: Policy information comes from country responses to the OECD STI Outlook policy questionnaires 2014 and 2012. Finland's responses are available in the OECD STI Outlook Policy Database, edition 2014 at <http://qdd.oecd.org/Table.aspx?Query=F0716DF1-E8C1-47D4-B5F2-D38D7ADC02F6>. Source: See reader's guide and methodological annex.

StatLink <http://dx.doi.org/10.1787/888933152141>

## 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 (△) 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 entrepreneurship 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	△	△	○	○	○	○	○			
Australia	AUS	▲	▲	▲	▲	△	△	▲	△		▲
Austria	AUT	▲	★	▲	▲	▲	▲	△	△	★	▲
Belgium	BEL	△	▲	▲	▲	△	▲	△	▲	△	△
Brazil	BRA		△	○		△	○	○			△
Canada	CAN	▲	▲	▲	△	△	▲	★	★	○	▲
Chile	CHL	○	△	○	○	○	○	△			△
China	CHN	△	△	○	▲	△	△	○			○
Colombia	COL	○	○	○	○						
Costa Rica	CRI	○	○	○	○	○					
Czech Republic	CZE	▲	△	△	△	△	△	△	○		△
Denmark	DNK	★	▲	★	▲	★	▲	▲	▲		▲
Estonia	EST	▲		▲	▲	○	△	△	▲		▲
Finland	FIN	★	★	▲	★	★	★	▲	★	★	▲
France	FRA	▲	△	△	▲	▲	▲	▲	▲	△	▲
Germany	DEU	★	▲	△	▲	▲	★	▲	▲	★	▲
Greece	GRC	○	△	△	○	△	○	○	○		△
Hungary	HUN	○	△	△	△	△	△	○	△		△
Iceland	ISL	★	○	★	▲	▲	△	★			△
India	IND	△	○	○	○	○	△	○			○
Indonesia	IDN		○	○	○		○	○			△
Ireland	IRL	△	▲	▲	△	▲	▲	▲	★	○	△
Israel	ISR	△	★	▲	★	▲	▲	▲	★		○
Italy	ITA	△	△	△	△	△	△	△	○	▲	★
Japan	JPN	▲	△	○	★	▲	★	△	△	○	▲
Korea	KOR	▲	△	△	★	▲	▲	▲	▲		△
Latvia	LVA	△	○	○	○		△				
Lithuania	LTU	△	○	○	○		△				
Luxembourg	LUX	○	○	△	△	★	▲	★	△		△
Malaysia	MYS	△	△	○	△	△					
Mexico	MEX	○	○	○	○	○	○	△			○
Netherlands	NLD	▲	▲	★	▲	▲	▲	▲	▲	▲	★
New Zealand	NZL	△	★	▲	△	△	△	★	△		★
Norway	NOR	▲	▲	△	△	▲	△	△	△	▲	△
Poland	POL	△	△	△	○	○	△	○	○		○
Portugal	PRT	△	▲	▲	△	△	△	△	△		▲
Russian Federation	RUS	△	○	○	△	△	○	○	△		△
Slovak Republic	SVK	△	○	○	○	○	○	○			★
Slovenia	SVN	△	▲	▲	▲	△	△	△	△		△
South Africa	ZAF	○	△	○	△	△	△	△	△		○
Spain	ESP	△	△	△	△	△	△	△	○	○	○
Sweden	SWE	★	★	★	★	★	★	▲	▲	★	△
Switzerland	CHE	▲	▲	★	▲	★	★	★	▲	★	▲
Turkey	TUR	△	○	○	△	△	○	○			○
United Kingdom	GBR	△	▲	▲	△	▲	▲	▲	▲	△	▲
United States	USA	▲	△	△	▲	▲	▲	▲	★	○	★
EU28	EU28	▲	▲	★	▲	△	▲	△	▲	▲	

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 (△) 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	○	○	○	○	○		△	★	▲	○		○	○
Australia	AUS	▲	△	★	▲	▲	▲	△	△	▲	▲	▲	★	▲
Austria	AUT	▲	△	▲	△	▲	△	★	▲	△	△	△	△	▲
Belgium	BEL	▲	▲	△	△	▲	▲	★	★	△	▲		▲	▲
Brazil	BRA		○	△	○		△	○	△	○	○		○	○
Canada	CAN	△	▲	△	▲	▲	▲	△	▲	★	★	▲	▲	▲
Chile	CHL		○	○	△	○	△	▲	△	★	○		○	○
China	CHN		○	○	○	▲	△	○	○		○			○
Colombia	COL		○	○	△			▲	△	★	△		○	
Costa Rica	CRI		○	○	○			★	★		△		○	
Czech Republic	CZE	△	△	△	○	△	△	△	▲	△	△	△	△	△
Denmark	DNK	★	★	★	★	△	★	▲	▲	▲	△	★	△	▲
Estonia	EST		△	▲	△	△		▲	★	▲	▲	○	★	△
Finland	FIN	△	▲	★	▲	★	▲	▲	△	★	▲	★	★	★
France	FRA	△	★	△	▲	△	★	▲	△	▲	△		▲	▲
Germany	DEU	△	▲	△	▲	★	▲	△	△	△	△	▲	▲	★
Greece	GRC	○	△	△	△	△	○	△	▲	▲	△		○	△
Hungary	HUN		△	○	△	▲	○	▲	▲	○	△		△	○
Iceland	ISL		▲	▲	△	★		★	▲	○	▲		△	△
India	IND		○	○	○		△	○	▲	○				
Indonesia	IDN		○	○	○			▲	★	○	○		○	○
Ireland	IRL	○	△	▲	△	○	★	▲	▲	▲	▲	○	▲	▲
Israel	ISR		△	△	▲	▲	★	△	△	▲	★		△	▲
Italy	ITA	△	△	△	△	○	△	△	○	○	○		△	△
Japan	JPN	★	▲	▲	▲	△	▲	○	○	▲	★	▲	★	△
Korea	KOR	▲	★	★	★	▲	★	○	○	★	★	○	▲	△
Latvia	LVA		△	△	△	▲		△	★	▲	△		○	△
Lithuania	LTU		△	○	△	★		△	△		▲		△	
Luxembourg	LUX	○	▲	▲	▲	△	△	★	★	○	▲		▲	
Malaysia	MYS		○	○	△			△	△	★	○		○	
Mexico	MEX	○	○	○	○	○	○	△	▲	△	○		○	○
Netherlands	NLD	▲	★	▲	★	★	▲	▲	△	▲	△	★	▲	△
New Zealand	NZL	★	▲	▲	▲	★	△	▲	△	▲	▲		★	▲
Norway	NOR		▲	▲	▲	▲	△	▲	△	▲	▲	★	△	▲
Poland	POL		○	▲	○	△	△	○	★	△	△	○	▲	○
Portugal	PRT	▲	△	○	△	○	○	△	▲	△	○		○	△
Russian Federation	RUS		○	△	△	★	○	○	△	△	★		○	○
Slovak Republic	SVK	○	○	△	○	△		△	▲	○	△	○	△	▲
Slovenia	SVN	△	△	△	△	▲	△	△	△	△	△		▲	▲
South Africa	ZAF		○	○	○	△	△	△	△	○	○			○
Spain	ESP	△	△	△	△	▲	▲	△	△	△	△		△	△
Sweden	SWE	★	▲	★	▲	▲	○	▲	△	▲	▲	★	△	★
Switzerland	CHE	★	★	△	▲	▲	▲	★	★	△	▲		▲	★
Turkey	TUR		○	○	○	▲	○	○	○	△	○		○	○
United Kingdom	GBR	▲	▲	▲	★	△	▲	△	▲	△	▲		▲	★
United States	USA	▲	▲	▲	★	△	▲	○	○	★	★	△	△	△
EU28	EU28	△	▲	▲		△	▲	▲	▲		△		△	▲

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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