

FINLAND

Hot STI issues

- Internationalising education, research and innovation and reforming PRIs.
- Broadening the scope of R&D and creating new growth enterprises in all sectors with a focus on SMEs.
- Addressing green growth through radical system changes.

General features of the STI system: For the past two decades, Finland's STI system has been highly ranked in international comparisons. Its economy is open and its businesses have good international links, although its research system is largely domestic (Panel 2). At 2.70% of GDP in 2010, BERD is well above the OECD median (Panel 1^(d)). Finland has a strong and sustained RTA in ICT, and has improved its RTA in emerging and environmental technologies over the past decade, though these are still below the OECD medians (Panel 3). There are strong links between industry and science, and much public research is funded by industry (1^(o)). International co-operation in science and innovation is mixed: 50% of scientific articles, slightly above the OECD median, but 19% of PCT patents, below the OECD median, are produced with foreign counterparts (1^{(q)(r)}). The rate of patents filed by universities and PRIs is well below the OECD median (1^(p)). Human capital indicators are sound, with 38% of the adult population tertiary-qualified (1^(s)) and 37% of persons employed in S&T occupations (1^(v)). Finland leads the OECD with 23 researchers per thousand employees, and ranks at the top of OECD-area PISA scores in science for 15-year-olds (1^(t)). ICT infrastructures are well developed, with 29 fixed broadband and 79 wireless subscribers per 100 inhabitants (1^{(k)(l)}). The e-government readiness is well above the OECD median and similar to that of Canada and Sweden (1^(m)).

Recent changes in STI expenditures: GERD stood at 3.88% of GDP in 2010, the second highest in the OECD area. Between 2005 and 2010 it has

increased regularly by 3.2% annually and is targeted to reach 4% of GDP by 2015. GOVERD is expected to fall in 2012, and public R&D is targeted to be 1% of GDP. Industry funded 66% of GERD in 2010 and government 26%, while 7% was funded from abroad. Given its high R&D intensity, the Finnish stimulus package of 2009 only moderately boosted STI spending with an additional USD 159 million.

Overall STI strategy: Finland's innovation system is currently undertaking a new round of reforms and refocusing its strategy. It was last evaluated in 2009. Recommendations included simplifying a complex and overlapping system, reviewing organisations and programmes, and reducing the number of R&D-related organisations and universities. The Demand and User-Driven Action Plan 2010-13 has meant a shift away from a supply-driven system. Areas to be addressed include the concentration of R&D and innovation in a few sectors, the low level of internationalisation of research, and fragmentation of education, research and innovation. Finland aims to have one of the world's best STI system by 2015.

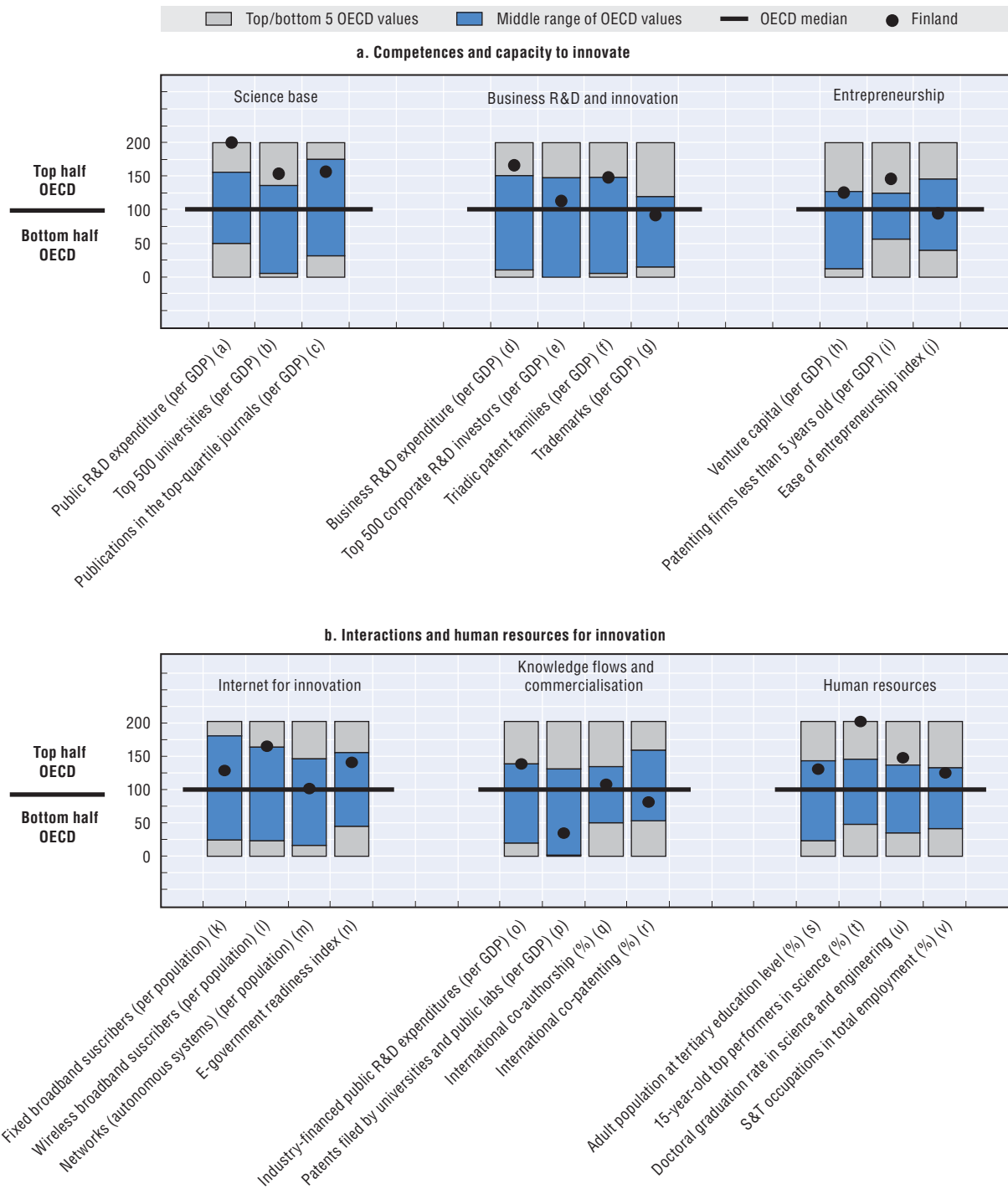
STI policy governance: The Ministry of Employment and Economy (MEE) was reorganised in September 2011 and is responsible for innovation policy planning and budgeting. The Ministry of Education and Culture (MEC) is responsible for higher education and science policy related matters. The Research and Innovation Council (RIC) is the main STI

Key figures

Labour productivity, GDP per hour worked in USD, 2010 (annual growth rate, 2005-10)	47.9 (+1.1)	GERD, as % of GDP, 2010 (annual growth rate, 2005-10)	3.88 (+3.2)
Environmental productivity, GDP per unit of CO ₂ emitted in USD, 2009 (annual growth rate, 2005-09)	3.46 (+0.7)	GERD publicly financed, as % of GDP, 2010 (annual growth rate, 2005-10)	1.00 (+3.2)

Figure 10.14. Science and innovation in Finland

Panel 1. Comparative performance of national science and innovation systems, 2011



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

advisory body. MEE, MEC and RIC together will draft a new Science and Innovation Policy Action Plan by early 2013. The plan will be a part of the Government's mid-term review. The Government Programme 2011-15 has outlined guidelines to improve innovation in the current economic climate. The single most important policy document is the Research and Innovation Policy Guidelines 2011-15. A new Government Working Group for the Co-ordination of Research, Foresight and Assessment started work in 2011. Several evaluations of programmes and projects are in progress and will report in 2012-13. RIC work to reform PRIs also started in 2011.

Science base: Finland has a strong science base, high public-sector expenditure on R&D, highly ranked universities and a relatively high rate of scientific publications relative to GDP (1^(a)(b)(c)).

Business R&D and innovation: The Finnish Funding Agency for Technology and Innovation (Tekes) has been shifting funding emphasis away from industrial and technological R&D-driven projects towards services firms, non-technical innovation and SMEs. A new R&D tax incentive scheme has been decided to be introduced probably in 2013 and is directed at companies and private venture capital. Tekes' new guiding principle for overall R&D funding is that the private sector should represent no less than two-thirds of GERD.

Entrepreneurship: Finland has a growing entrepreneurship culture, a robust venture capital industry (1^(h)), and a very high relative number of young patenting firms (1⁽ⁱ⁾). The policy shift towards SMEs should improve the ease of entrepreneurship index (1^(j)). Enterprise Finland is an online advisory service for SMEs. The Vigo Accelerator programme has raised capital of some USD 80 million for promising start-up firms in clean technology, ICT, mobile and life sciences.

Public-sector innovation: To optimise public services the Innovative Forerunner Cities Initiative targeted a group of ten innovative cities. Managing Innovations is a joint ministerial effort to increase policy co-ordination. In 2011, it was decided in principle to make public-sector data, archives and information available at no charge.

ICT and scientific infrastructures: ICT enjoys high priority. The National Digital Library, the IT Centre of

Science, the Finnish Social Science Data Archive and Apps4Finland are digital information management programmes. Tekes supports a range of technology-targeted programmes, such as Value-added Mobile Solutions (VAMOS), a wireless technology project, and ubicom technology.

Globalisation: To address the moderate level of international research collaboration, Finland adopted the Strategy for the Internationalisation of Education, Research and Innovation (2010-15) prepared by the RIC. The Strategic Centres for Science, Technology and Innovation (SHOKs) and the Centre of Expertise Programme (OSKE) support cluster development. Finnvera, the state-owned finance company, offers loans and guarantees to exporting firms, while Groove (2010-14), with Tekes funding of USD 173 million, helps SMEs expand globally. International enterprises with R&D activities in Finland are eligible for Tekes funding.

Human resources: Educational reforms have been implemented recently to ensure a well-functioning educational system and competitive labour market. The Universities Act changed the status of universities, increased their autonomy and merged a number of universities and HEIs into the University of Eastern Finland, the University of Turku and Aalto University. The Distinguished Professor Programme (FiDiPro) is a joint programme of Tekes and the Academy of Finland to attract leading international researchers. The LUMA Centre promotes science and mathematics studies. As part of its Europe 2020 Strategy, Finland seeks to increase tertiary attainment to 42%. Universities compile doctoral programmes in graduate schools focusing on research career's development.

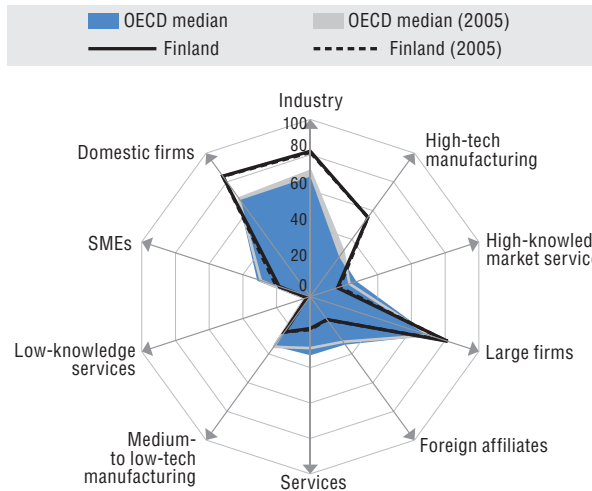
Emerging technology fields: Tekes supports innovation in a number of emerging technology fields: services sector, pharmaceuticals, boating, tourism, food and water, biotechnology, ICT and digital, and safety and security. Tekes also funds infrastructure to support the use of electric vehicles.

Green innovation: R&D investments in energy technology have been increasing since the mid-2000s and rose by USD 324 million in 2010. A government strategic programme was launched in 2012 to promote growth, business activity, innovation and internationalisation of the environment business

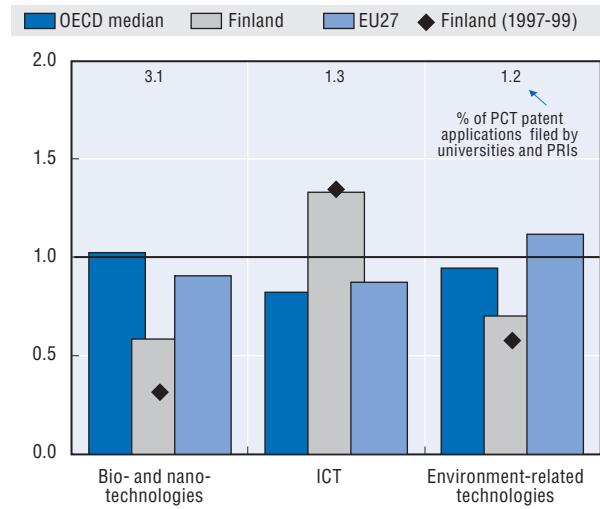
sector. Tekes recently launched a new programme, Towards Sustainable Growth and Green Economy. The Centre of Expertise Programme includes clusters in clean technology, energy and forestry. Four SHOKs will specialise in green growth research. The ICOS project monitors greenhouse gases, and the Fuel Cell

Programme 2007-13 has a budget of USD 185 million to develop alternative energy solutions. The Finnish Environment Institute (SYKE), the VTT Technical Research Centre and the LYNEX Consortium of several PRIs conduct environmental research.

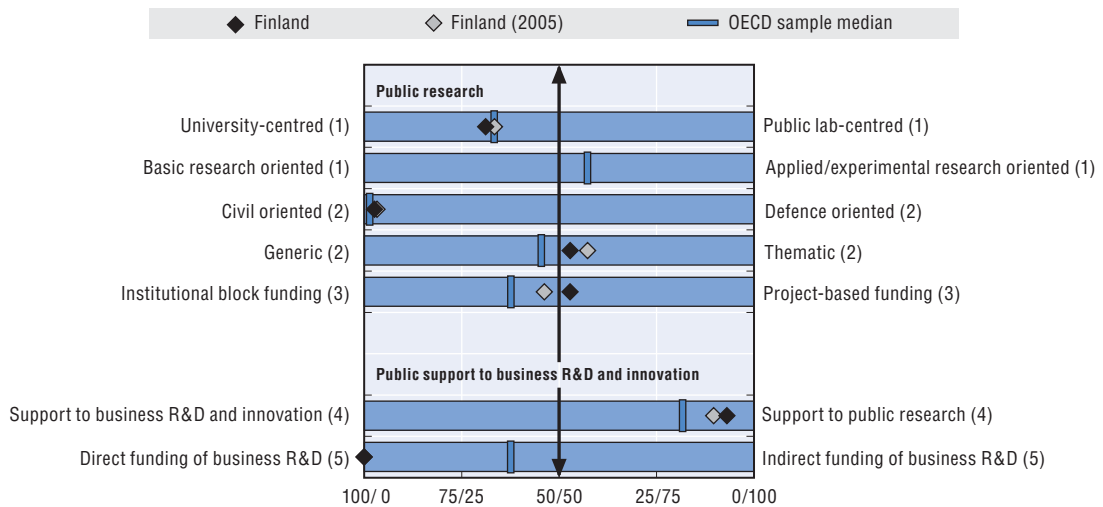
Panel 2. Structural composition of BERD, 2009
As a % of total BERD



Panel 3. Revealed technology advantage in selected fields, 2007-09
Index based on PCT patent applications



Panel 4. Overview of national innovation policy mix, 2010



1. Balance as a percentage of the sum of HERD and GOVERD.
2. Balance as a percentage of total GBAORD.
3. Balance as a percentage of total funding to national performers.
4. Balance as a percentage of the sum of HERD and GOVERD funded by government and higher education and components of (5).
5. Balance as a percentage of the sum of indirect funding of business R&D and innovation through R&D tax incentives and direct funding of BERD through grants, contracts and loans.

Source: See reader's guide and methodological annex.

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