ESTONIA

Hot STI issues

Improving Estonia's long-term growth through:

- Increasing the quality and efficiency of public research and reforming the public R&D funding system.
- Strengthening the private sector's R&D investment and innovation capability and the business environment for innovation.
- Strengthening the future supply of PhDs in S&E.

General features of the STI system: Estonia is a small OECD economy and its government's priorities include R&D and innovation. Over the past decade, Estonia has strengthened its R&D and innovation system through market-oriented reform of the former Soviet system. Estonia has one of the highest GERD growth rates in the OECD area, at 11.8% a year during 2005-10. BERD increased significantly from 0.42% to 0.82% of GDP over the same period. In 2010, the business sector performed 50% of GERD, up from 45% in 2005. Nonetheless, business innovation remains below the OECD median in terms of R&D expenditure (Panel 1[(d)]), top firms (1[(e)]), patents (1[(f)]) and trademarks (1[(g)]), and it is concentrated in a limited number of high-technology sectors, such as ICT, biotechnology, and financial and telecom services. Estonia has a relatively strong public and university research system (1[(a)(c)]), a solid human capital base (1[(s)(t)(u)(v)]), good connections to global knowledge networks (1[(q)(r)]) and Internet infrastructure and use is at the OECD median (1[(k)(l)(m)(n)]).

Recent changes in STI expenditures: In spite of the economic crisis, GERD rose from 1.28% of GDP in 2008 to 1.63% of GDP in 2010. The government funds 44% of GERD, the business sector 44%, and foreign sources 11%. For 2007-10, government-financed GERD and industry-financed GERD increased from 0.45% to 0.71% and from 0.49% to 0.72% of GDP, respectively. Forecasts suggest public R&D budgets are likely to increase in the coming years.

Overall STI strategy: The Knowledge-Based Estonia II Research and Development and Innovation Strategy 2007-13 sets the key objectives and technological priorities for R&D. The main objectives are to increase the quality of both public research and private-sector innovation and the potential for long-term growth. These objectives are to be achieved by developing human capital (*e.g.* increasing the attractiveness of researcher careers); increasing enterprises' innovation capacity; developing policies for long-term growth; and reorganising public-sector R&D and innovation to increase efficiency (*e.g.* modernising R&D infrastructures). The key technologies identified in the strategy are ICTs, biotechnology and material technologies. The strategy for 2014-20 will be formulated during 2012.

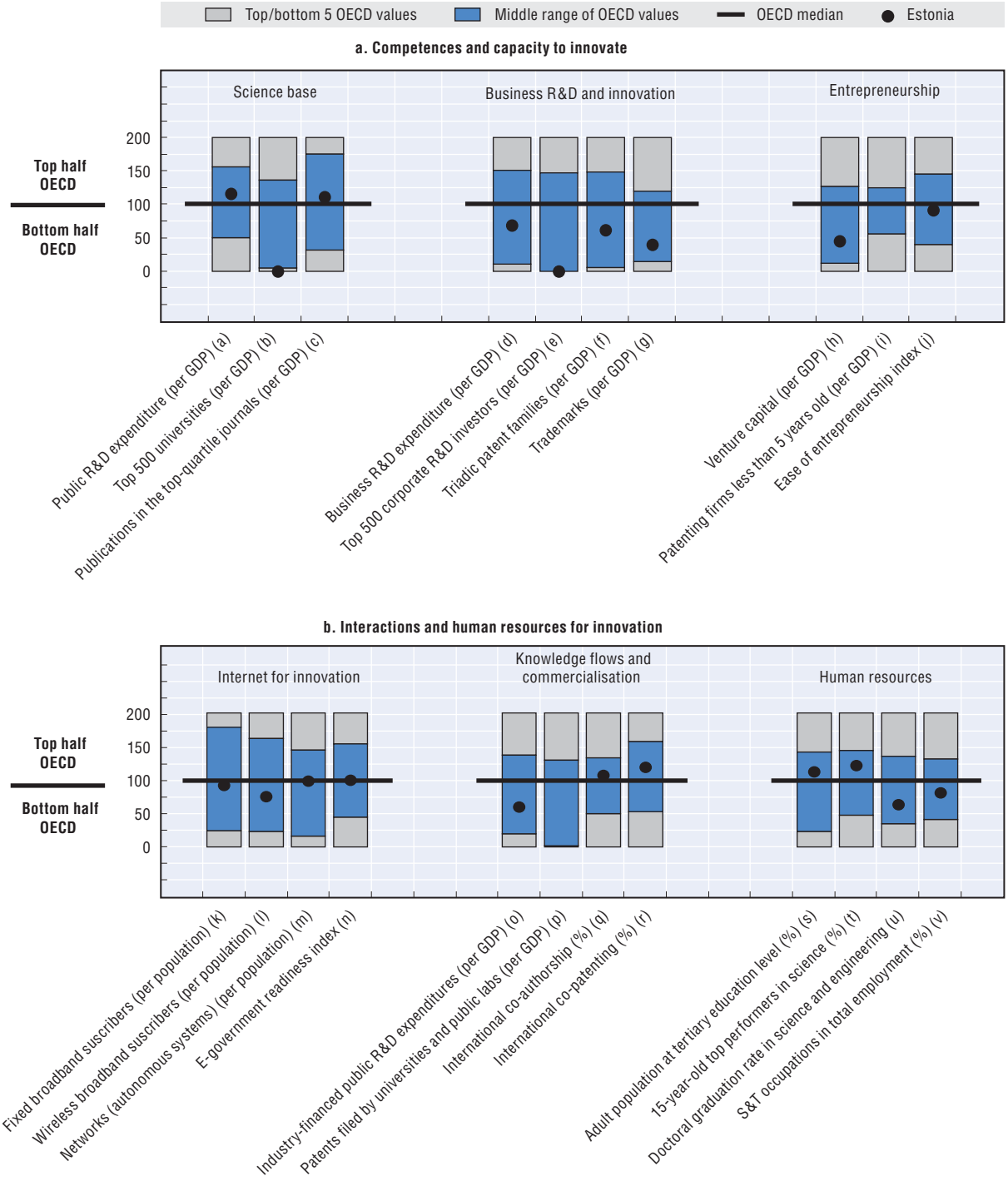
STI policy governance: The Estonian Research Council was created by the 2011 amendment of the *Organisation of Research and Development Act* to serve as a funding agency; it has absorbed the previous Estonian Science Foundation and Archimedes Foundation. Its missions are to: foster basic and applied R&D, support researchers, encourage international co-operation and co-ordinate and implement national and international training and educational and research programmes.

Key figures

Labour productivity, GDP per hour worked in USD, 2010	**26.4**	**GERD, as % of GDP, 2010**	**1.63**
(annual growth rate, 2005-10)	(+3.2)	(annual growth rate, 2005-10)	(+11.8)
Environmental productivity, GDP per unit of CO_2 emitted in USD, 2009	**1.77**	**GERD publicly financed, as % of GDP, 2010**	**0.73**
(annual growth rate, 2005-09)	(+2.5)	(annual growth rate, 2005-10)	(+12.1)

Figure 10.13. **Science and innovation in Estonia**

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).

Science base: Over the last decade, Estonian public research has improved significantly. The four public universities play an important role in R&D and stand slightly above the OECD median in terms of international scientific publications (1[(c)]). However, university-performed GERD fell from 52% in 2000 to 38% in 2010. The Estonian government has adopted several programmes to support knowledge production and to increase universities' excellence, competitiveness and internationalisation. The amendment of the *Organisation of Research and Development Act* introduced two new types of R&D evaluation: regular evaluations to assess R&D quality against internationally recognised criteria and targeted evaluations designed to improve research in specific fields.

Business R&D and innovation: During 2001-10 BERD grew faster than in other OECD countries. Yet, as a share of GDP and of patenting by firms, BERD remains well below the OECD median. Moreover, just 58 firms account for 75% of BERD. The Estonian government intends to stimulate business R&D and innovation with direct funding (*e.g.* innovation vouchers) and non-financial measures (*e.g.* the Innovation and Entrepreneurship Awareness and Competence Raising Programme 2009-13).

Entrepreneurship: The conditions for entrepreneurship and innovation are below the OECD median (1[(h)(j)]). Efforts are under way to promote entrepreneurship (*e.g.* Innovation and Entrepreneurship Awareness and Competence Raising Programme 2009-13; Start-up Estonia). In addition, fostering entrepreneurship in HEIs is part of the Government Action Plan 2011-15.

ICT and scientific infrastructures: Investments in R&D infrastructures are largely funded by EU structural funds. The total budget for 2007-13 is USD 320 million, split between investment in buildings (USD 165 million) and in research equipment (USD 157 million). In 2010, the government adopted a Research Infrastructures Roadmap outlining the need to upgrade existing research infrastructures and create new research facilities. It lists 20 research infrastructures of national importance and serves to guide public investments in R&D infrastructures over the next 10-20 years.

Knowledge flows and commercialisation: Efforts are being made to strengthen interactions between the scientific and business communities (*e.g.* the University of Tartu has adopted a new governance structure which involves external partners in the university's work and the government has a programme for training doctoral students in co-operation with business).

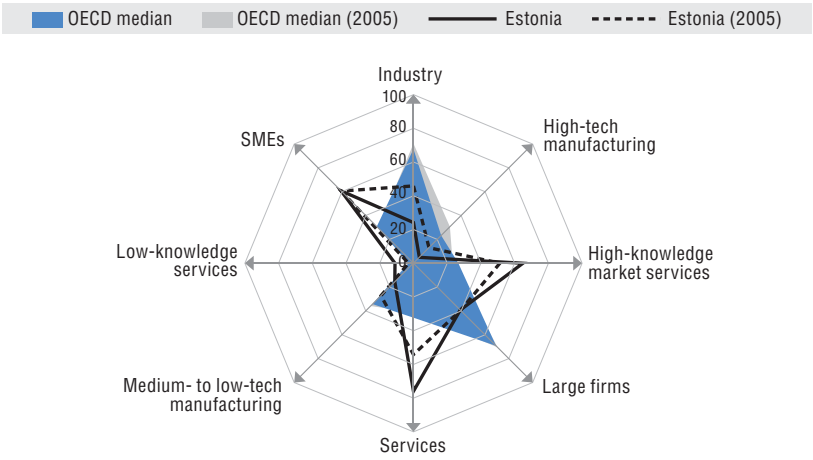
Human resources: The Estonian population's tertiary education level is above the OECD median (1[(s)]). In view of the low rate of S&T doctoral graduates, the Archimedes Foundation created in 2010 a Unit for Science Communication to co-ordinate several publicly funded initiatives and to manage a programme to raise young people's interest in S&T careers (budget of USD 6.5 million for 2009-13). Also, the Higher Education Strategy and the R&D and Innovation Strategy have as an objective 300 PhD graduates a year by 2015.

Emerging technologies: The Estonian government has launched six national R&D programmes in support of R&D in energy technology, ICT, biotechnology, health, environment technology and material technology. The Centres of Excellence and Competence Centres programmes also clearly target ICTs, environment and new materials, health care and medicine.

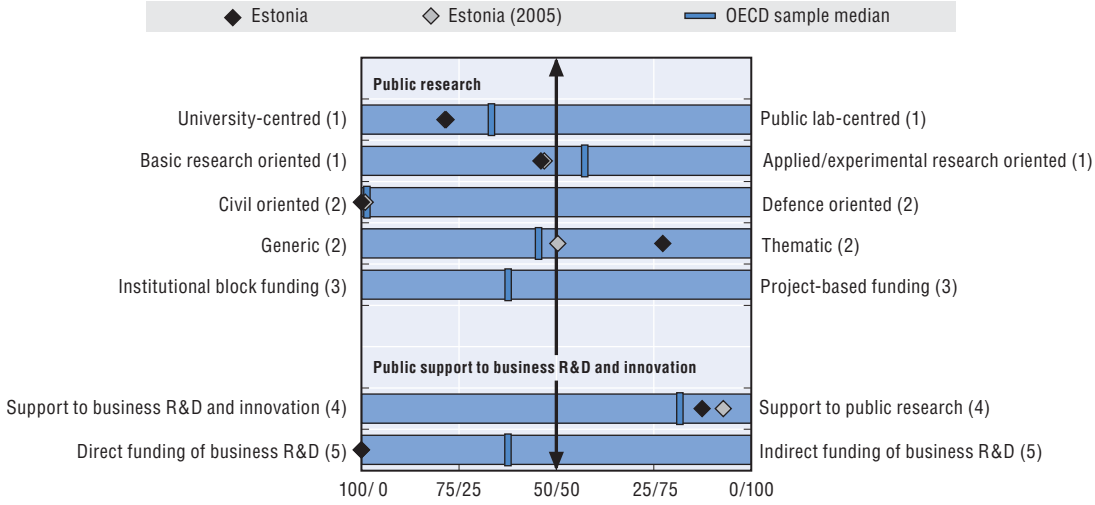
Green innovation: Energy, sustainable development and environmental issues are increasingly important government priorities. This is reflected, for example, in the Estonian Energy Technology Programme, a co-operation programme involving research, business and the state, to develop oil shale technologies and new, mainly renewable, energies.

Panel 2. Structural composition of BERD, 2009

As a % of total BERD



Panel 3. 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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