

## KOREA

**Hot STI issues**

- Achieving more balanced and sustainable growth with a strong, innovative SME sector.
- Diversifying the economy into newly emerging technology areas.
- Implementing the five-year-plan for green growth with green R&D at 2% of GDP.

**General features of the STI system:** Korea is committed to technology-based economic development and enjoys a national consensus on the importance of STI. It has high levels of R&D expenditure, a highly educated labour force, good and improving innovation framework conditions, large knowledge-intensive and internationally competitive firms, and a strong ICT infrastructure. Almost three-quarters of Korean R&D is performed by business, with 88% in manufacturing in 2010, second only to Germany; 48% was carried out in a single sector, Radio, television and communication equipment, by far the largest share among OECD countries. BERD grew by 9.5% a year in real terms during the decade to 2010, rising from 1.70% of GDP in 2000 to 2.80% of GDP in 2010. The shares of public research funded by industry and of patents filed by universities and public labs per GDP are well above the OECD median (Panel 1<sup>(o)(p)</sup>). Levels of international collaboration are very low: just 26% of scientific articles are produced with international co-authorship (1<sup>(q)</sup>), and only 4% of PCT patent applications were produced with international collaboration (1<sup>(r)</sup>), the latter owing in part to Korea's conglomerate industrial structure which tends to retain technology development within the group. Korea has a high tertiary attainment rate of 39% (1<sup>(s)</sup>) and the 8th highest PISA scores in science for 15-year-olds (1<sup>(t)</sup>). It has a strong and increasing RTA in ICTs; it is considerably weaker in bio- and nano-technologies (Panel 3). ICT infrastructures are

strong: there are 36 subscribers per 100 inhabitants to broadband and 99 per 100 to wireless networks (1<sup>(k)(l)</sup>). Korea's e-government readiness index is the highest in the OECD (1<sup>(n)</sup>).

**Recent changes in STI expenditures:** Korea's GERD was 3.74% of GDP in 2010 and has grown by a robust 9.3% a year over the past decade, and by 10% a year over the five years to 2010. In 2010, 72% of GERD was funded by industry, 27% by government and only 0.2% from abroad.

**Overall STI strategy:** Korea's 577 Initiative aims to increase GERD to 5% of GDP by 2012, nurture seven strategic technology areas, and become the world's seventh "S&T power". To meet these targets, the government has increased government expenditure on R&D and has used various tax incentives to encourage more private investment in R&D. In line with a decade-long trend, government support has continued to shift away from large firms towards SMEs.

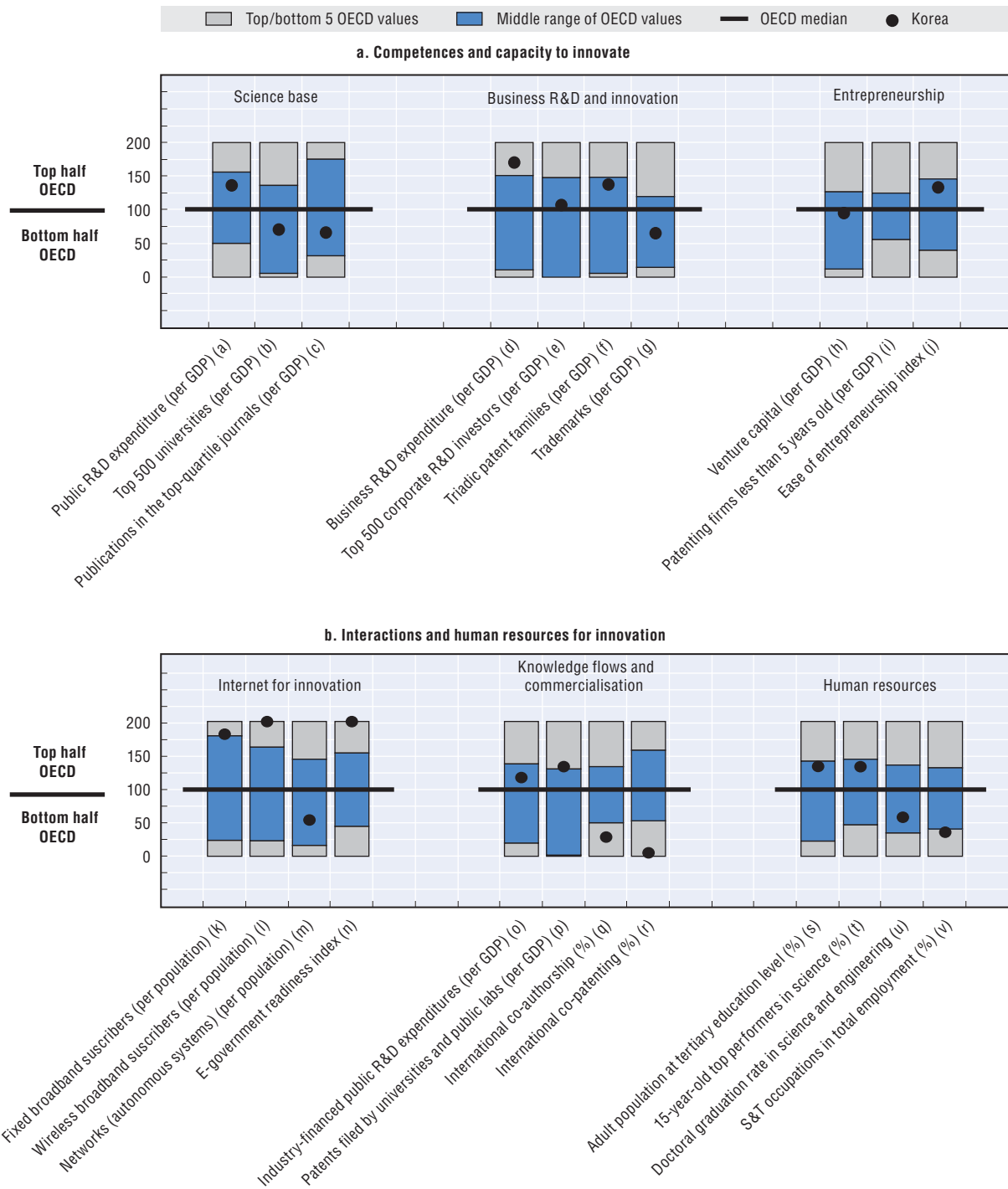
**STI policy governance:** In 2011, the National Science and Technology Commission (NSTC) was reconstituted as a co-ordinating agency with considerable responsibility for national STI policies and allocation of public R&D funding. The key STI funding ministries are the Ministry of Education, Science and Technology (MEST), the Ministry of Knowledge Economy (MKE) and the Ministry of Strategy and Finance (MOSF). MEST and MKE have agencies that administer much of their funding.

**Key figures**

<b>Labour productivity, GDP per hour worked in USD, 2010</b> (annual growth rate, 2005-10 )	<b>27.2</b> (+4.4)	<b>GERD, as % of GDP, 2010</b> (annual growth rate, 2005-10)	<b>3.74</b> (+10.0)
<b>Environmental productivity, GDP per unit of CO<sub>2</sub> emitted in USD, 2009</b> (annual growth rate, 2005-09)	<b>2.57</b> (+0.6)	<b>GERD publicly financed, as % of GDP, 2010</b> (annual growth rate, 2005-10)	<b>1.03</b> (+13.2)

Figure 10.26. **Science and innovation in Korea**

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:** Although Korea has relatively high public-sector expenditures on R&D, its universities and research publication outputs rank comparatively low by international standards (1<sup>(a)</sup>(b)(c)). Its university research sector has only recently started to perform a larger share of public-sector R&D (Panel 4) and still produces small numbers of PhDs in S&E (1<sup>(u)</sup>). The research system is also heavily skewed towards thematic R&D which is largely applied and development-oriented (Panel 4) with a focus on industrial technologies. There are signs of change, however: as part of the 557 Initiative, basic research increased to 35% of the total in 2012 and government support is placing greater emphasis on “high-risk, high-return” research.

**Business R&D and innovation:** The structure of BERD shows that R&D is mainly conducted by large manufacturing conglomerates (Panel 2). Small and young firms have contributed relatively little to innovation, though there are signs of improvement. Much government support to the business sector goes to SMEs. The Small and Medium Business Administration’s R&D investments for start-ups will increase by 33% in 2012, and MKE has announced that the share of its R&D budget allocated to SMEs will reach 40% of the total by 2015.

**ICT and scientific infrastructures:** Given the presence of Korea’s home-grown global IT firms the ICT sector is exceptionally strong. The Telecommunication Technology Association plays an important role in ICT standardisation. Other ICT initiatives include a software bank for innovation in software ecology. Korea invests heavily in research infrastructures and has established the National S&T Information Service (NTIS), a centralised database on S&E human resources and S&T infrastructure, to better monitor these developments.

**Clusters and regional policies:** The Seoul Metropolitan Area is the focus of much S&T and innovation activity and this has led to quite unbalanced regional growth. In response, the

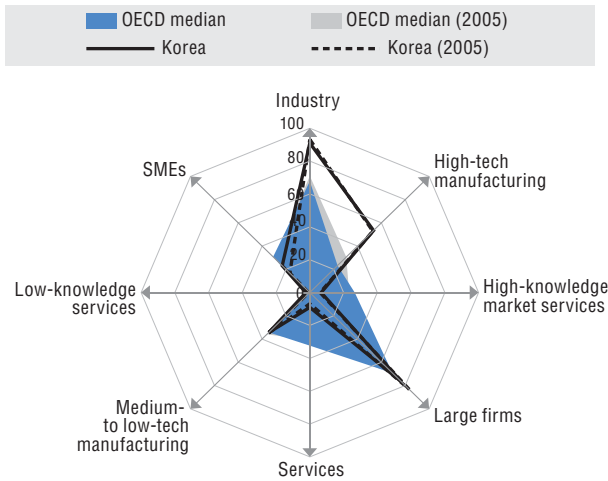
government has introduced a number of schemes over the years. As a result, Korea had 105 regional innovation centres and 18 techno-parks in 2010, as well as seven programmes to strengthen the competitiveness of industrial cluster programmes.

**Knowledge flows and commercialisation:** A raft of schemes aim to improve commercialisation and knowledge transfer from public sector research. These include the Technology Holding Company system, which promotes the establishment of venture businesses by universities and research institutes, as well as the Leaders in Industry-University Programme (LINC) and the Brain Korea Programme (BK), both of which seek to improve industry-academia collaboration. In a more global perspective, the Intellectual Management Property Council manages overseas patent disputes, while various IPR-related laws were amended in 2011 to protect core national technologies.

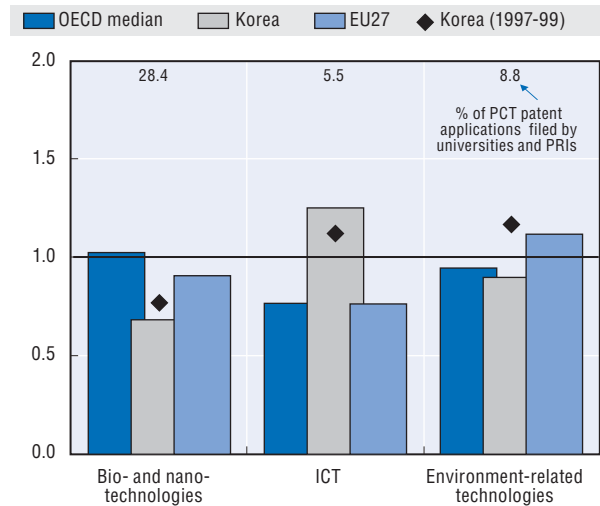
**Human resources:** Korea’s R&D system has one of the widest gender gaps. To reduce this gap, several programmes (WIST, WISE and WIE) support women in S&T careers. Korean R&D has also been relatively closed; few foreigners work in Korean labs. Several schemes have been launched to internationalise the Korean research system, including the CAMPUS Asia Programme and Global Korea Scholarships Programme, as well as adjustments in various laws to promote researcher mobility. The World Class University Project was launched in 2008 with funding of USD 143 million; its aim is to attract leading researchers to Korea. To encourage entrepreneurship, the Entrepreneurship Leading Universities Programme supports entrepreneurship education with block funding.

**Green innovation:** Korea has prioritised green innovation at the highest level. The Presidential Committee on Green Growth was established to address climate challenges through low-carbon green growth and the Global Green Growth Institute (GGGI) was launched in 2010 to conduct policy research. The 557 Initiative has earmarked USD 2.4 billion to invest in green technology.

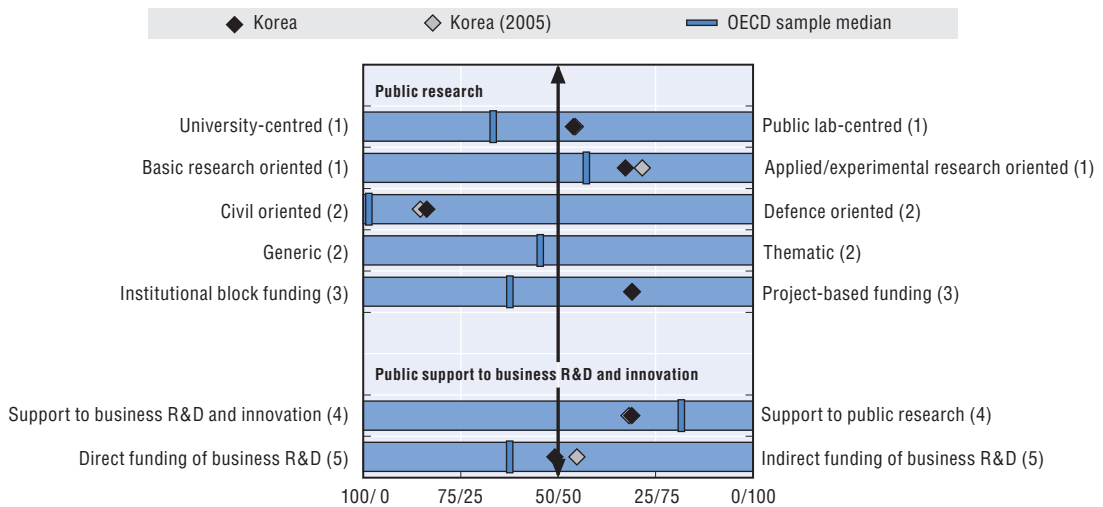
**Panel 2. Structural composition of BERD, 2009**  
As a % of total BERD



**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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