

TURKEY

Hot STI issues

- Becoming Eurasia's production base for medium-high- and high-technology products.
- Implementing a targeted and mission-oriented STI strategy.
- Implementing evaluation and monitoring of all STI support schemes.

General features of the STI system: Turkey is a large emerging market economy. It has gone through crises (2001, 2009) and periods of fast economic growth over the past decade. It has shifted rapidly from an economy largely based on agriculture (which still accounts for 24% of total employment) and on an abundant low-skilled labour force (which supported the growth of traditional labour-intensive industries such as textiles) towards an industrial economy. Turkey is now a major European automotive producer, a world leader in shipbuilding, and a significant manufacturer of electronics and home appliances (e.g. TV, white goods). Its STI system however remains small. BERD was 0.36% of GDP in 2010, well below the OECD median (Panel 1^(d)), and is concentrated in a few medium-high-technology manufacturing industries and knowledge services (Panel 2). Connections between industry and academia are good and 13% of public R&D is contracted or subsidised by enterprises (1^(o)). Turkey has weak links to international research networks (1^{(q)(t)}): a low 7% of PCT patent applications and 18% of scientific articles are produced with international collaboration. Entrepreneurship conditions are poor (1^(j)). Product market regulations, particularly employment protection legislation, are restrictive and network monopolies hinder competition. Productivity gains are concentrated in the modern part of the economy; the large informal sector has less access to finance, STI networks and human capital and has limited overall STI potential.

Turkish ICT infrastructures need to be improved (1^{(k)(l)(m)}) and the government makes little use of the Internet to interact with citizens and businesses (1⁽ⁿ⁾). Skills are weak: 12% of the adult population has tertiary education (1^(s)) and 13% of employees are in S&T occupations (1^(v)). Turkey has still few researchers (2.9 per thousand employment) but their number has almost tripled in ten years. Moreover, only 1% of 15-year-olds are top performers in the PISA rankings (1^(t)), and there are few graduates at doctoral level and fewer in S&E programmes (1^(u)).

Recent changes in STI expenditures: GERD was USD 9.6 billion and 0.84% of GDP in 2010. It grew by 10.7% a year between 2005 and 2010 and has been little affected by economic shocks. Implementation of the Turkish Research Area (TARAL) in 2004 gave an impetus to public R&D budgets; government has a sustained commitment to STI and business R&D spending recovers rapidly after crises. In 2010, industry funded 45% of GERD, and government and higher education funded 50%.

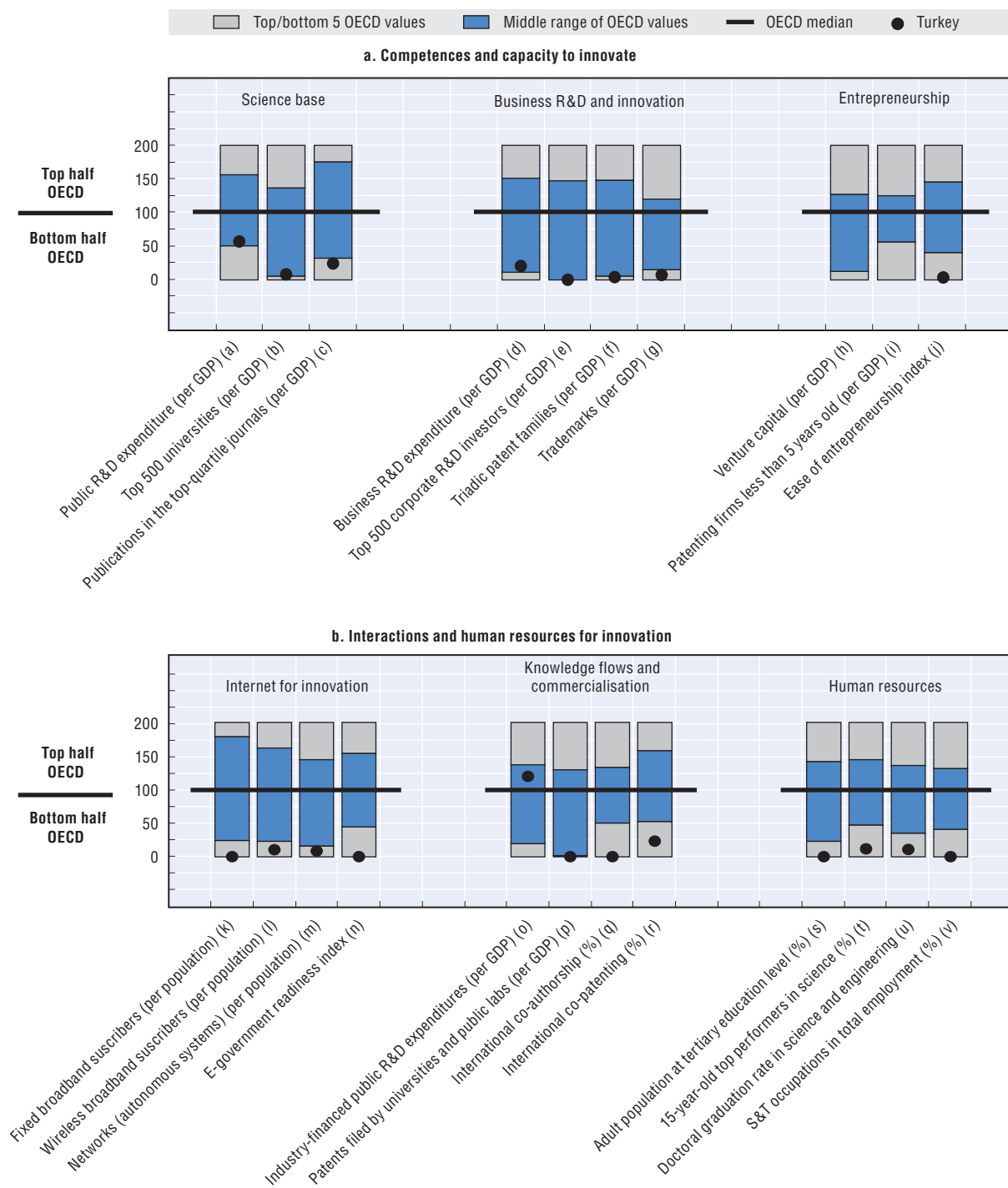
Overall STI strategy: The National Science, Technology and Innovation Strategy (2011-16) (UBTYS) aims to strengthen national R&D and innovation capacities in order to upgrade the industrial structure towards high-technology industries. GERD should reach 3% of GDP by 2023. UBTYS targets competitive sectors with strong STI potential (automotive, machinery, various

Key figures

Labour productivity, GDP per hour worked in USD, 2010 (annual growth rate, 2005-10)	26.3 (+1.4)	GERD, as % of GDP, 2010 (annual growth rate, 2005-10)	0.84 (+10.7)
Environmental productivity, GDP per unit of CO₂ emitted in USD, 2009 (annual growth rate, 2005-09)	4.06 (-2.4)	GERD publicly financed, as % of GDP, 2010 (annual growth rate, 2006-10)	0.42 (+13.1)

Figure 10.41. Science and innovation in Turkey

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).

manufacturing and ICT) and areas of global demand (energy, water, food, security and space). The Turkish Industrial Strategy Document and Action Plan (2011-14) and several sector-centred plans reinforce this targeted approach and the priority of the business sector.

STI policy governance: Since 2011, a new Ministry of Science, Industry and Technology (MoSIT) is in charge of STI policy design, implementation and co-ordination of R&D and innovation activities. The Scientific and Technological Research Council of Turkey (TUBITAK) and the Turkish Academy of Science (TUBA) are affiliated to the Ministry. Evaluation policy has been reinforced and an inter-ministerial co-ordination board has been set up to review all R&D, innovation and entrepreneurship support schemes under the presidency of TUBITAK.

Science base: Turkey's public research system is small (0.48% of GDP in 2010) and universities account for 80% of total expenditures (Panel 4). It has few articles in top scholarly journals (1^(c)) and only one world-class university (1^(b)). Public research is currently undergoing major reforms to improve the quality and relevance of public R&D, increase collaboration with the private sector and leverage private funding. Since 2011, a university index has been developed under the responsibility of TUBITAK, the Higher Education Council and TurkStat to evaluate universities' entrepreneurship and innovativeness performance based on criteria such as articles, R&D projects, collaboration, licences and spin-offs.

Business R&D and innovation: Turkey aims to increase BERD to 2% of GDP by 2023. During the 2009 crisis USD 217 million was earmarked to TUBITAK to support STI actors via various grant schemes. TUBITAK's main funding instrument, the Industrial R&D Funding Programme, has increased grants by 10% for certain technology fields (IT, biotechnology, environment-related technologies, advanced materials). A new small business innovation and research support programme was implemented in 2012.

Entrepreneurship: Entrepreneurship is a main STI policy priority. The Techno-Entrepreneurship Grant Programme provides young entrepreneurs with

grants in order to steer entrepreneurship towards technology and innovation. The Council for Entrepreneurship was established in 2012 to help entrepreneurs access domestic and foreign financing. The G-43 Developing Anatolian Venture Capital Fund deals with SMEs' financing issues in less developed regions. Efforts are also made to promote entrepreneurship culture in education from primary schools to universities.

Clusters and regional policies: Smart specialisation and clustering have recently attracted policy attention. Province-level innovation platforms were set up in 2010 to transform local knowledge into economic and social benefits by stimulating co-operation. In 2011 TUBITAK launched a competitive funding programme to set up regional innovation platforms and co-operation networks at the local level. The law on technology development zones (TDZ) fosters the creation of technology parks. Financial support is provided through tax incentives for land procurement, infrastructure and buildings.

Knowledge flows and commercialisation: The relative number of patents filed by universities and PRIs per GDP is low (1^(p)). In 2011 TUBITAK implemented the Technology Transfer Support Programme for SMEs to encourage the commercialisation of public research results in collaboration with SMEs. The Turkish Patent Institute works to raise awareness of IPRs in the business community and collects data on licensing activities in order to increase revenues from patents. A draft Patent Law is currently under debate to improve the Turkish IP system and better align it with EU and international legislation.

Human resources: Turkey lags behind OECD countries in terms of human resources (1^{(s)(t)(u)(v)}). The aim of the Action Plan to Strengthen Links between Vocational Education and Employment, issued in 2010, is to establish a national skills classification, revise curricula and strengthen co-operation with employers. An Initiative for Enhancing Opportunities in Technology (FATIH) has been set up to improve education in STEM and non-S&T fields through new learning practices and new instructional tools. The National Science and Technology Human Resources Strategy and Action

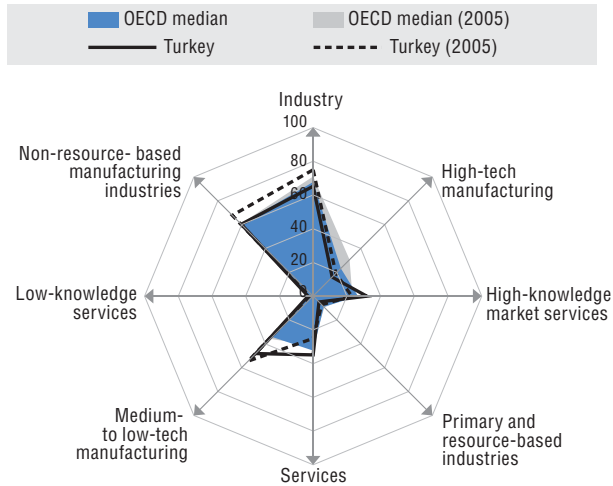
Plan (2011-16) aims to increase R&D personnel, foster a research culture, and develop researchers' skills, mobility and employability.

Green innovation: Owing to its recent industrial boom and rapid urbanisation, Turkey has seen a 2.4% annual decline in environmental productivity

over 2005-09. The National Food, Water and Energy R&D and Innovation Strategies 2011-16 are co-ordinated by TÜBİTAK and call-based target-oriented support mechanisms have been launched recently. The Turkish Energy Efficiency Strategy (2012-23) has been adopted.

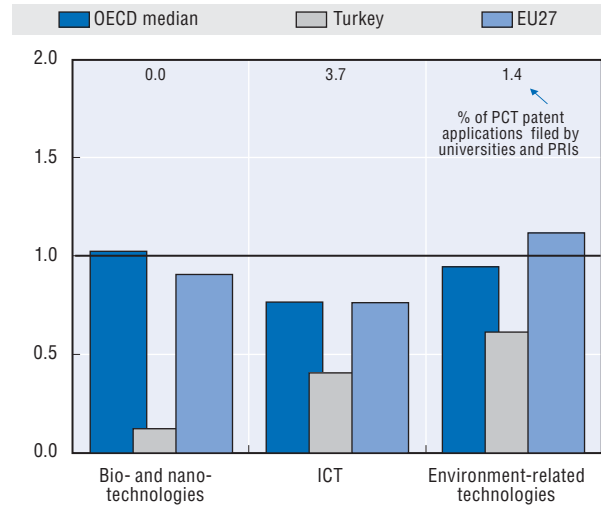
Panel 2. Structural composition of BERD, 2009

As a % of total BERD

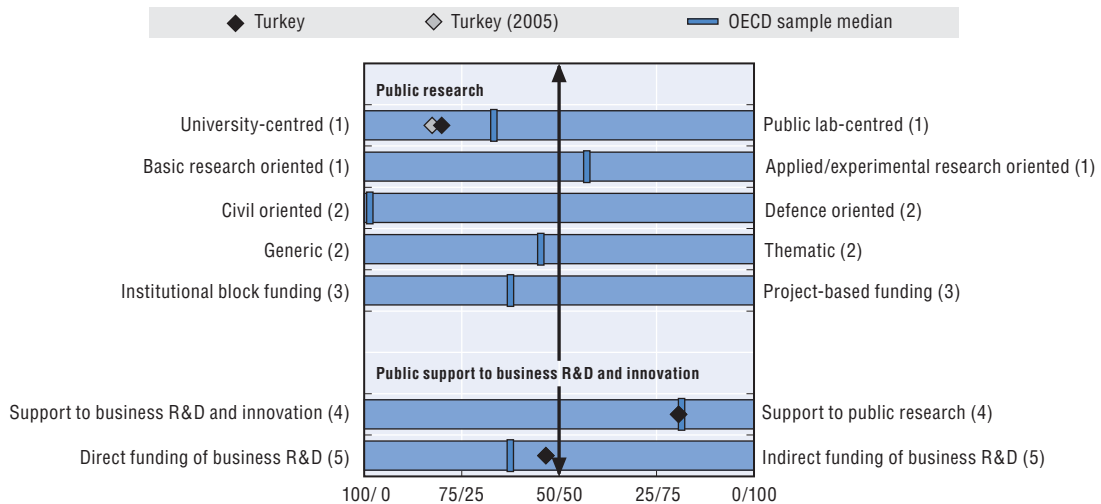


Panel 3. Revealed technology advantage in selected fields, 2007-09

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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