

BRAZIL

Hot STI issues

- Supporting innovation to expand the basis for environmental sustainability and developing a low carbon economy.
- Promoting technological innovation in the business sector including SMEs.
- Supporting innovation to address social challenges (inclusiveness).

General features of the STI system: Brazil is an emerging economy which weathered the global financial crisis well with a continuing upward growth trajectory. Brazil has some well-known leading innovative firms (Panel 1^(e)) and is at the forefront in high-technology fields such as deep water oil extraction. A few universities undertake high-quality research (1^(b)). This performance, however, does not spill over to the entire, very diversified Brazilian economy. In particular, the many SMEs innovate very little. Challenging framework conditions and substantial social challenges, such as poverty, explain the generally weak STI performance. Research outputs are very low compared to the OECD in terms both of articles published in top-quartile scientific journal (1^(c)) and of patents and trademarks (1^{(f)(g)}). Over 2005-09, the relative number of patents filed by universities and PRIs per GDP was well below the OECD median (1^(p)). Conditions are difficult for private firms; the ease of entrepreneurship index is low but is above that of some OECD countries (1^(j)). In terms of international innovation-related linkages, 27% of total scientific articles involved international co-authorship (1^(q)) and 17% of PCT patent applications were international co-inventions (1^(r)). One of the reasons for these comparatively low numbers is the large size of the Brazilian economy. A major innovation system bottleneck is Brazil's human capital. In 2009 only 11% of the adult population had a tertiary education level (1^(s)). The PISA science scores of 15-year-olds are also very low (1^(t)).

Recent changes in STI expenditures: In 2008, Brazil's GERD was 1.08% of GDP, a share that is below the OECD median, but above other major Latin America economies such as Argentina, Chile and Mexico.

Overall STI strategy: The Greater Brazil Plan 2011-14, adopted in 2011, gives innovation a central role and includes proposals for significant changes in legal frameworks. Moreover, the National Strategy in Science, Technology and Innovation (ENCTI) was designed to: i) close the technological gap with developed economies; ii) support Brazil's leadership in the nature-related knowledge economy (including green innovation, agro-business and other natural-resource-based activities); iii) strengthen the internationalisation of the national research system; iii) foster the development of a green economy; and iv) address social and regional inequalities.

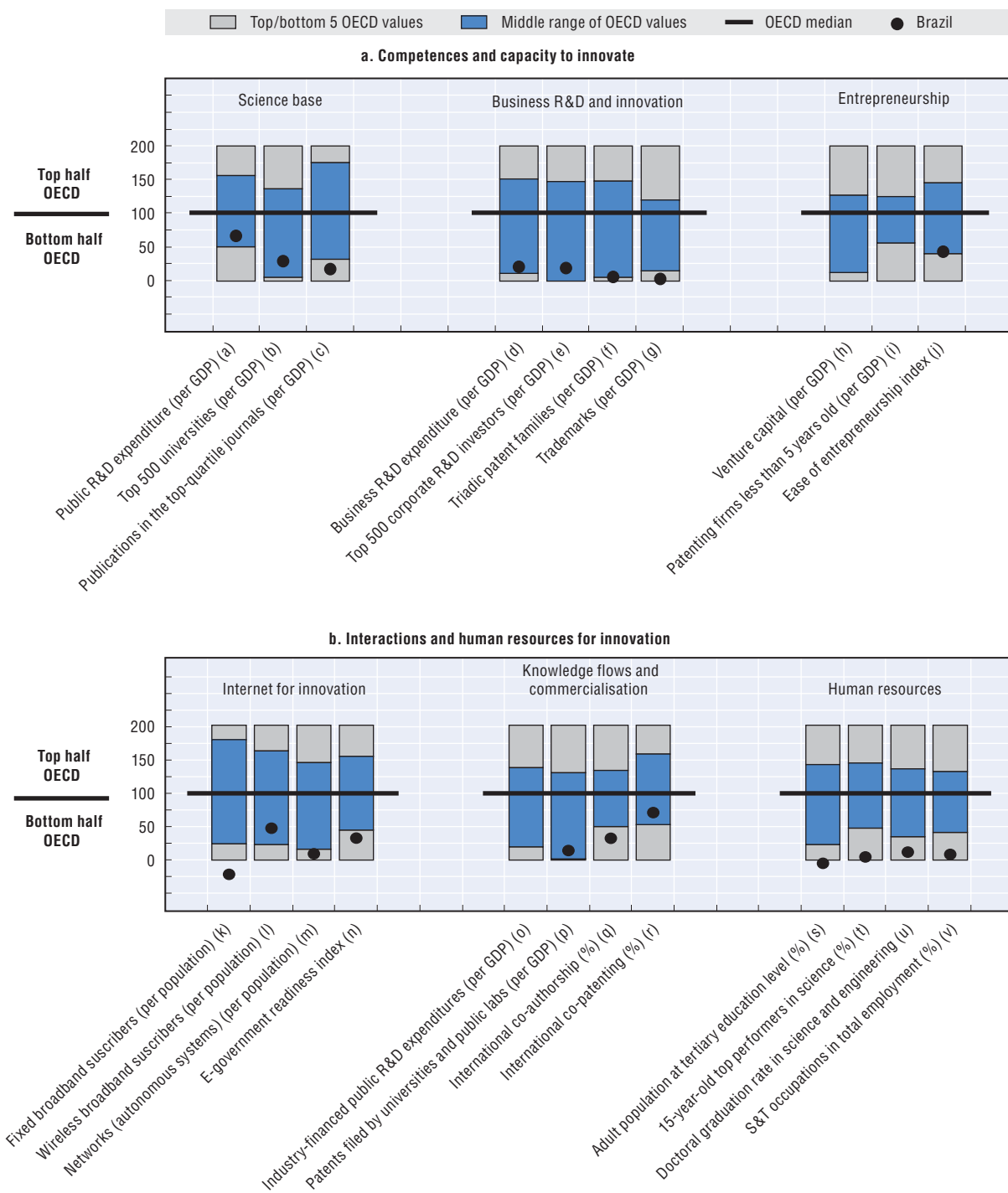
STI policy governance: Brazil's STI policy governance has not recently undergone major changes. However, several measures aim to improve co-ordination between institutions at the federal level and between federal and state bodies. The National Council for Industrial Development was redesigned in August 2011. It includes ministries, the president of the National Bank for Economic and Social Development (BNDES), private businesses, and industry and labour union representatives, among others. It aims at better co-ordination and greater involvement of stakeholders.

Key figures

Labour productivity, GDP per hour worked in USD, 2010 (annual growth rate, 2005-10)	n.a.	GERD, as % of GDP, 2008 (annual growth rate, 2005-08)	1.08 (+8.9)
Environmental productivity, GDP per unit of CO₂ emitted in USD, 2009 (annual growth rate, 2005-09)	5.95 (+3.6)	GERD publicly financed, as % of GDP, 2008 (annual growth rate, 2005-08)	n.a. n.a.

Figure 10.5. Science and innovation in Brazil

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).

Business R&D and innovation: Brazil's innovation policy has moved from focusing mainly on the science base to stronger support for business R&D. Several changes in the legal framework allow for an increase in incentives: the *Innovation Law* (2004) permits direct funding of business through competitive grants; the annual budget amounts to some USD 348 million. The *Goodwill Law* (2005) introduced a wide range of fiscal incentives. Also, tax exemption rules for companies were modified in 2007 to link them to the use of IPRs. The Greater Brazil Plan includes proposals for further legal changes, such as the funding of private non-profit institutes and new fiscal incentives for investors. Moreover, funding agencies provide support for developing low-cost, easy-to-use applications that address social challenges. For example, HABITARE, an initiative of some USD 14 million, supports innovations in housing technology, including for social housing.

Entrepreneurship: Several initiatives support start-ups. Financial support is provided through grants (Programa Primeira Empresa Inovadora, PRIME, under which a total of 1 381 enterprises have received about USD 98 million), venture capital investments (INOVAR), or reduced interest loan programmes (Juro Zero Programme). In addition, the Pro-Innova programme introduced in 2008 encourages entrepreneurship by diffusing information about the legal tools, facilities and mechanisms available to support initiatives.

Knowledge flows and commercialisation: Greater emphasis has recently been placed on supporting individual firms and the commercial development of technological innovations. The *Innovation Law* (2004) helps establish innovative companies by offering incubation services in public S&T institutes, and facilities for public researchers to take part in joint projects and the establishment of start-ups. In addition to financial support schemes for collaborative research projects (e.g. SIBRATEC, with investments of USD 204 million from 2007), Brazil has several programmes to encourage researchers' sectoral mobility (e.g. PAPPE, the

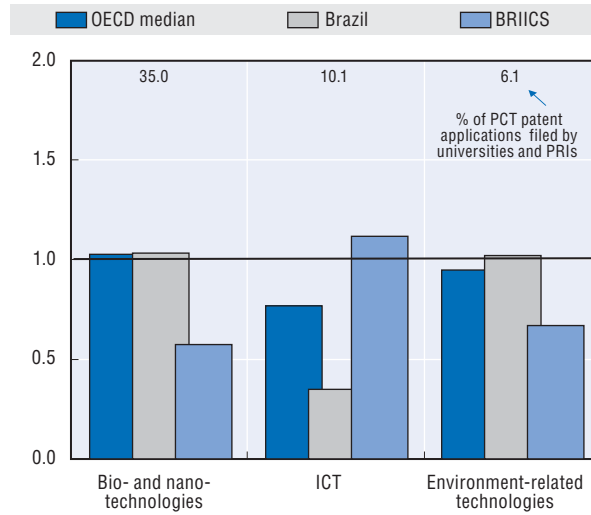
Programme for Support of Research in Enterprise, of some USD 146 million from 2007 to 2010, and SEBRAE, the Brazilian Support Service for Small Enterprises). These programmes seek to encourage knowledge flows between universities and PRIs and the business sector.

Globalisation: Recent programmes promote the internationalisation of the national research system. In December 2010, an inter-ministerial committee was established to act as a one-stop shop for potential foreign investors and to provide information on the legal framework and available innovation support instruments. Moreover, *Ciência sem Fronteiras*, a programme launched in 2011, supports the mobility of national students and seeks to attract young and internationally recognised researchers by providing funding to engage in research projects abroad and to attract foreign researchers.

Human resources: Efforts have been made to increase the quality of education at all levels, including the introduction of entrance examinations for teachers. To support bigger enrolment rates, funding for basic and professional education has increased and conditions for student loans have been eased. In addition, the Brazilian Mathematics Olympiad Competition for Public Schools (OBMEP) seeks to stimulate and promote mathematics studies among public school students. By awards to top participants and their schools, the programme also encourages the improvement of teaching.

Green innovation: The development and promotion of a green economy are objectives of Brazil's STI strategy. Support programmes include sectoral funds (CT-Energy, CT-Petro). In terms of the environment, the National Policy on Industry, Technology and Trade has programmes for the creation of a biotechnology centre and for biodiesel research. In February 2012, the creation of a new Climate Fund under BNDES was announced. Its purpose is to finance projects to reduce greenhouse gas emissions.

Panel 2. Revealed technology advantage in selected fields, 2007-09
Index based on PCT patent applications



Source: See reader's guide and methodological annex.

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