

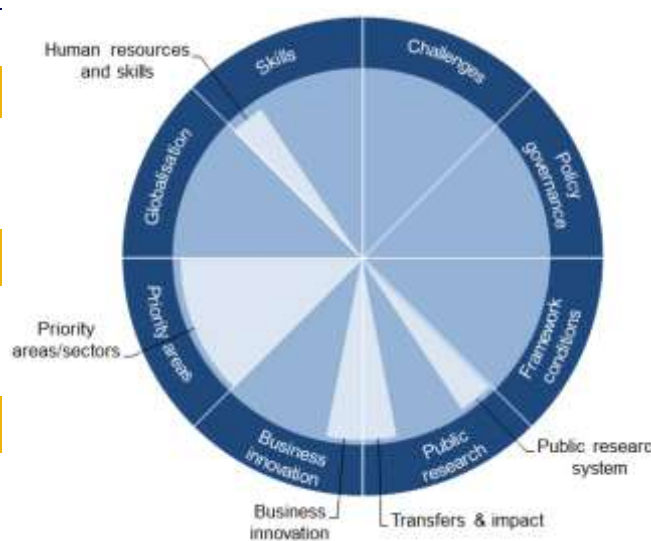
MEXICO

Since 2013, Mexico's economic growth has stagnated, and labour productivity, which had been on a slow slope for several years, has not caught up to the OECD average, despite rising recently. In this context, the Mexican government is continuing to reinforce the instruments and strategies set forth by the National Development Plan (PND) (2013-18) for ensuring sustainable socio-economic growth. The Special Programme for Science, Technology and Innovation (PECITI) (2014-18) was designed to transform Mexico into a knowledge-based economy by: 1) increasing national investment in STI; 2) forming highly qualified human resources in science and technology (HRST); 3) strengthening regional development; 4) promoting science-industry linkages; and 5) developing the S&T infrastructure. The federal government budget for STI is expected to increase by 25.6% during 2014-18, with GERD set to rise to 1% of GDP by 2018.

Table 1. Gross domestic expenditure on R&D (GERD)

| | MEX | OECD |
|----------------------------------|---------|-----------|
| GERD | | |
| USD million PPP, 2014 | 11 683 | 1 181 495 |
| As a % of total OECD, 2014 | 1.0 | 100 |
| GERD intensity and growth | | |
| As a % of GDP, 2014 | 0.54 | 2.38 |
| (annual growth rate, 2009-14) | (+9.8) | (+2.3) |
| GERD publicly financed | | |
| As a % of GDP, 2014 | 0.40 | 0.61 |
| (annual growth rate, 2009-14) | (+11.9) | (+2.5) |

Figure 1. Major STI policy priorities, 2016





Hot issues

Improving the overall human resources and skills

Public expenditure on higher education as a share of GDP is just below the OECD median (5³). However, a number of indicators suggest the need to improve the scale and quality of the education system (5^{1,v,w}). The Council for Science and Technology (CONACYT), the principal body in charge of Mexico's STI policy, is continuing to address the challenge of improving the quality of HRST through several initiatives. The Young Talents programme, introduced in 2014, provides scholarships for graduate studies in Mexico or abroad, fosters the creation of S&T oriented programmes and promotes Mexican HEIs internationally. The National Programme of Quality Graduate Programmes (PNPC) is continuing to improve the quality of the graduate programmes offered by HEIs and PRIs through a rigorous accreditation process based on international standards. In 2015, the PNPC launched a call to recognise postgraduate programmes with strong industry linkages that meet quality standards. Some 22 courses have already been approved, while others continue to be evaluated.

Encouraging business innovation and innovative entrepreneurship

As in other Latin American countries, Mexico's ratio of BERD to GDP is well below the OECD median (5⁴). The CONACYT, which manages around 40% of the public STI budget, seeks to encourage business R&D and innovation, essentially through competitive grants (9, 10). Its Innovation Incentives Programme (PEI) has proved to be effective in stimulating business innovation, particularly in SMEs. The Programme's overall budget increased from USD 223 million PPP (MXP 1 663 million) in 2009 to an estimated USD 500 million PPP (MXP 4 000 million) in 2014. Furthermore, Mexico's framework conditions for entrepreneurship are not very supportive (5⁵). The government created the National Institute of the Entrepreneur (INADEM) in 2013 to support SMEs and manage funds to promote national, regional and sectoral growth through entrepreneurship and business development. In 2014, the Fund for Supporting SMEs (Fondo Pyme) and the Entrepreneur Fund (Fondo Emprendedor) were merged to form the National Entrepreneur's Fund, to be managed by the INADEM. Public procurement has been identified as the most relevant policy instrument to support business innovation (10). In 2012, Mexico adopted new legislation to encourage departments and agencies to develop S&T projects with Mexican HEIs and PRIs in applied and/or technological innovation research. And a Fund for Investment and Technological Development Schemes in the amount of USD 126 thousand PPP (MXN 1 million) has been earmarked from the 2014 budget to promote public partnerships. In addition, on September 2016, the government presented a proposal to implement a corporate income tax deduction for 30% of R&D investments. It is expected that this new R&D tax credit will be implemented by mid-2017.

Targeting priority areas/sectors

Mexico is active notably in the sectors of aerospace, automobiles and foods and beverages and shows a strong relative specialisation in biotechnology (8). Its relative performance in ICT and environment-related technologies has, however, deteriorated significantly over the past decade. The CONACYT has recently reinforced the sectoral orientation of several of its budget lines. The Sectoral Funds provide R&D resources for strategic thematic areas, including environmental studies and access to water and forestry. In particular, the SENER fund for sustainable energy supports the development of STI solutions in energy efficiency, renewable energy, clean technologies and the diversification of energy sources. The Mixed Funds (FOMIX), set up by the federal government as joint CONACYT-state funds, promote applied research at the state and municipal levels. In addition, the Science Institutional Fund finances thematic research networks and funds researchers and PRIs in thematic areas such as biotechnology and biomedicine, nanotechnology, advanced computing and alternative energies.

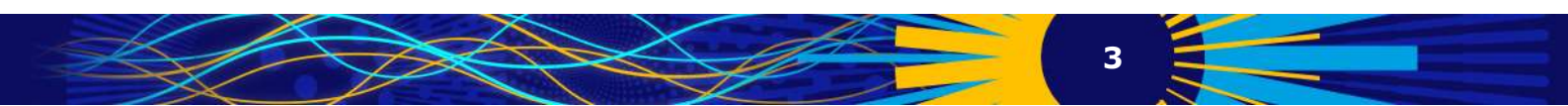


Strengthening the public research system

Public R&D expenditure came to 0.25% of GDP in 2011, still below the OECD median (5th). Recognising the importance of strengthening the scientific and technological infrastructure, the government has significantly increased its funding from USD 37 million PPP (MXP 285 million) in 2011 to USD 140 million PPP (MXP 1 097 million) in 2013 in real terms. In terms of scientific production, Mexico is also well below the OECD median (5th). To improve the performance of its public research system, the CONACYT Chairs (Cátedras CONACYT) created 799 new research positions in public universities and PRIs during 2014-2015. The goal of this programme is to increase the share of young researchers in public research. In 2014, the National System of Researchers (SNI), which recognises excellence in research and provides monetary rewards to top-level researchers, was extended to researchers in private universities. Overall, the 2013 18 PND allocated more resources to increase the number of affiliates. Seeking to promote the digitalisation of scientific information and open access to it across Mexico, in 2009 the CONACYT and several of the country's PRIs and HEIs set up the National Consortium of S&T Information Resources. It aims to facilitate the capacity of these institutions to access scientific information in digital formats, particularly by supporting the consultation of international journals and databases. More recently, in 2015, the CONACYT launched the General Guidelines for National Repository and Institutional Repositories. These aim to expand, consolidate and facilitate access to domestic and international information derived from academic and STI activities in digital formats. In the same year, the CONACYT also released a set of technical guidelines on the creation of institutional open-access repositories.

Improving the transfer of science and its returns and impacts

Mexico suffers from poor industry-science linkages, as reflected by the low share of public R&D funded by industry and the few patenting activities performed by universities and PRIs (5th). Several instruments under the CONACYT's PEI aim to foster science-industry linkages by offering financial incentives for innovation, with an emphasis on co-operation between PRIs/HEIs and industry and on technology transfer (see the section below on technology transfer and commercialisation). During 2009-15, the proportion of joint projects funded by the PEI has grown by 17%. The CONACYT's INNOVAPYME fund, which supports the innovation activities of micro-firms and SMEs, provides 50% of total project expenditures if the firm collaborates with an HEI or PRI, but only 35% in the absence of co-operation. The expenditures of collaborating HEIs or PRIs are financed at 90%. Its INNOVATEC fund, which supports large firms, provides 30% of total expenditure for joint projects in collaboration with HEIs or PRIs, but only 22% without collaboration. The collaborating HEIs or PRIs are financed at 70%. The PROINNOVA funds the development of products based on frontier scientific research for up to 70% of the expenditures of firms and 90% of those of HEIs or PRIs. In order to foster technology transfer and the commercialisation of public research, the Ministry of the Economy and the CONACYT have also provided support for the creation and improvement of knowledge transfer offices (KTOs). Legislative changes have made it possible for PRIs to establish the conditions for using the IP generated by their employees and to appropriate the economic benefits. The government also supports KTOs as enablers of science-industry relationships through consulting services and support for technology licensing and start-ups. Finally, to encourage intersectoral mobility, Mexico released a National Register of Postgraduate Quality, i.e. a list of Industrial Postgraduate Programmes with linkages to the industrial sector, which are evaluated based on the quality of their training programme for scientists and skilled technologists and their social impact.



Some key STI performance indicators

Figure 2. Economic performance

Labour productivity, GDP per hour worked,
index 2005=100

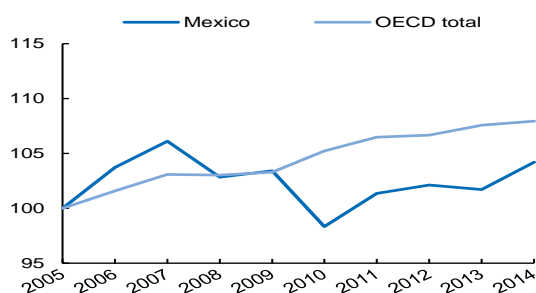


Figure 3. Environmental performance

Green productivity, GDP per unit of CO2
emitted, index 2005=100

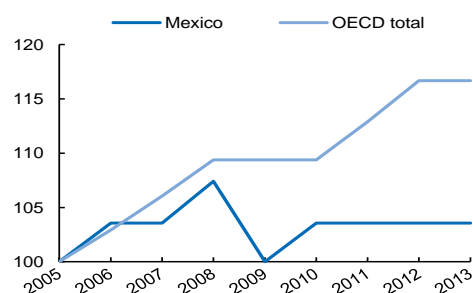
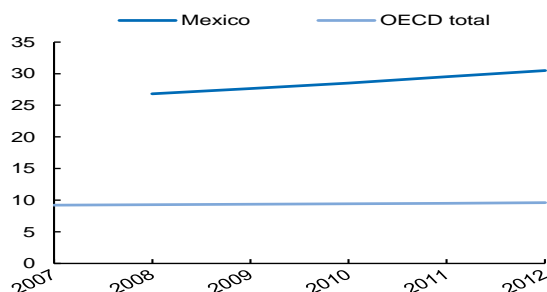


Figure 4. Income inequality

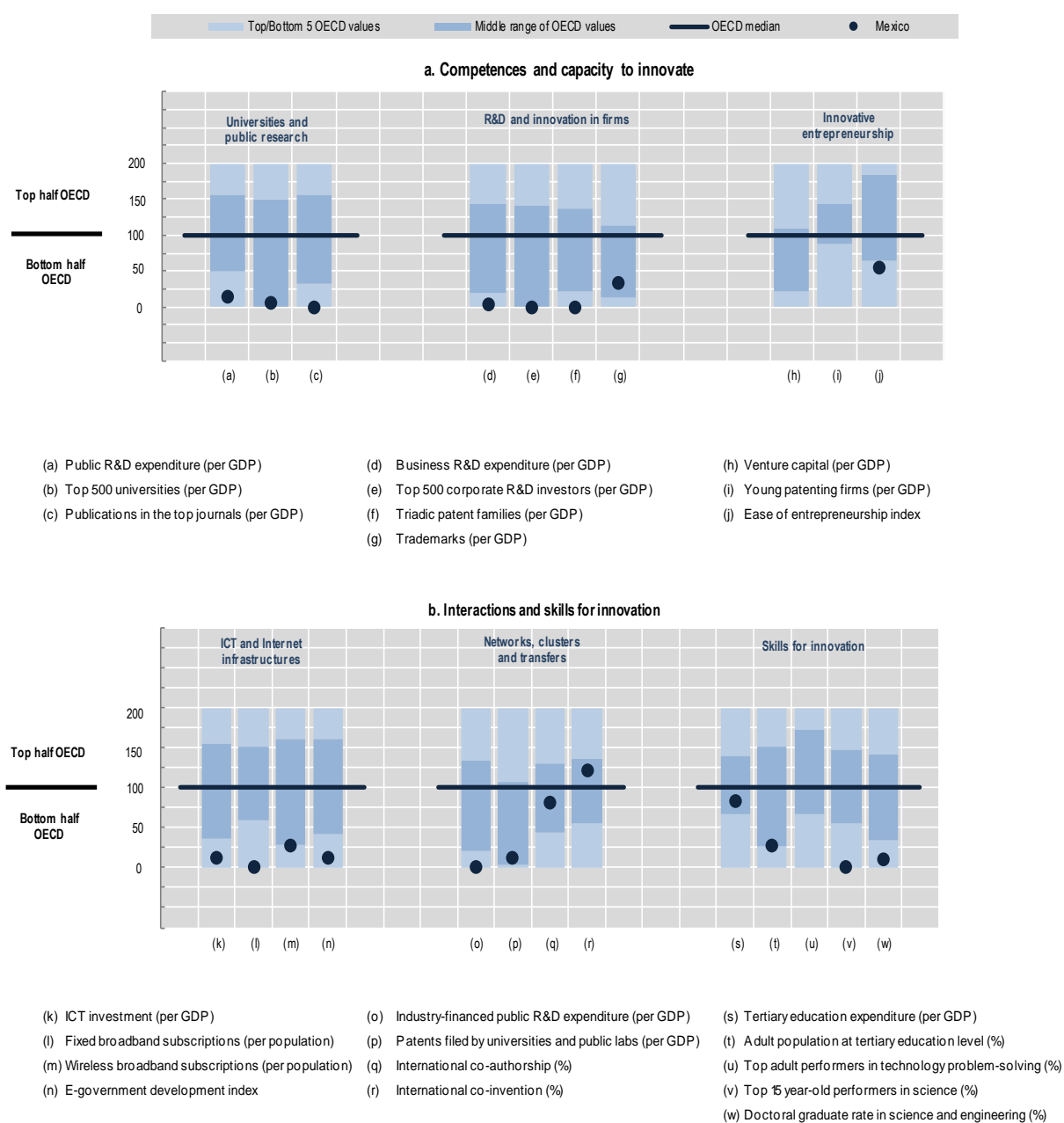
Ratio top decile/first decile of real household
net disposable income



Benchmarking national STI systems

Figure 5. Science and Innovation in Mexico

Comparative performance of national science and innovation systems, 2016



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



Highlights of the Mexican STI system

New challenges

Mexico is confronted with major socio-economic challenges related to persisting slow productivity performance, high income inequality and severe environmental threats. The General Law of Climate Change published in 2012 led to the creation of the Special Programme for Climate Change, which aims to provide fast-track solutions that can help the country deal with and adapt to this social challenge. In particular, the Programme aims to reduce the vulnerability of population groups and enterprises and strengthen the resilience of the affected infrastructure, promote the conservation of ecosystems, reduce GHG emissions and other pollutants affecting human health and consolidate national climate change policy across the different levels of government. Furthermore, the SEP CONACYT fund set up in 2015 allocates resources for basic research that could lead to innovative solutions to national problems, have a social impact or offer practical applications for high technology. It has provided about 100 000 USD for each of 140 projects.

STI policy governance

The federal government, which took office in 2012, introduced changes in STI policy governance. The Office of Coordination of Science, Technology and Innovation, located within the office of the President, was created in 2013 with the task of coordinating the CONACYT and relevant federal departments and agencies and achieving a more effective and transparent use of public resources. There has also been a shift in evaluation policy toward more intensive programme evaluation, and growing attention has been paid to the impact assessment of STI policies. In 2013, a set of key STI indicators was introduced into the National Indicators Catalogue (Catálogo Nacional de Indicadores).

ICT and Internet infrastructures

Mexico's ICT infrastructures are poorly developed, partly because the domestic network industries are protected from competition. The intensity of domestic ICT investment remains low, and there are few e government initiatives by OECD standards ($5^{k,l,m,n}$). Similarly, the current adoption rates of ICT by SMEs remain well below those observed in other OECD countries. However, Mexico began to rapidly expand fibre optics penetration in 2012, and entry prices to fixed broadband have been slashed. The National Digital Strategy (2013) aims to make Mexico the leading country in digitisation in Latin America by focusing on innovation and entrepreneurship in the digital economy, improving the quality of education through ICTs, contributing to the transformation of government, guaranteeing universal access to health services and increasing civil participation. In that line, and as part of the Open Government Action Plan 2013 15, the 2015 Open Data Law mandates a by-default opening of governmental datasets. The National Development Agenda Prosoft 3.0 seeks to make Mexico the second-largest exporter of IT globally and quadruple the sector's value. Prosoft 3.0 outlines strategic areas for the next ten years, including stimulating digital markets, developing IT skills and a business culture for the IT industry, making funding available for IT companies, promoting local initiatives and encouraging smart specialisation based on specific high-value niches in the IT industry, building a favourable legal framework for the production and adoption of IT, encouraging the internationalisation of domestic IT firms and attracting FDI. In parallel, Prosoft 3.0 calls for measures to ensure personal data protection and better accountability in the use of these data.



Globalisation

Mexico is very open to world markets and well engaged in international co patenting activities (5^o). However, its connections with the global academic community through international co authorship are loose (5^o). The CONACYT maintains diverse multilateral and bilateral cooperation agreements and has provided various scholarships aimed at encouraging international mobility at the higher education level. Areas of research cooperation include geothermal energy, ICT and health, in particular chronic diseases (e.g. diabetes), and infectious disease preparedness. The International Scholarships programme supported 4 196 beneficiaries conducting graduate programmes abroad in 2013. While Mexico is still in the process of defining a concrete institutional policy for the internationalisation of its STI system with clear priority issues and areas, its participation in the European Horizon 2020 programme provides a major opportunity for internationalising its research system. To support capitalising on this opportunity, the CONACYT provides additional funding to institutions and researchers that have been awarded H2020 grants.

Structural aspects and specialisation

Figure 6. Structural composition of BERD, 2013 or latest year available
As a % of total BERD or sub-parts of BERD

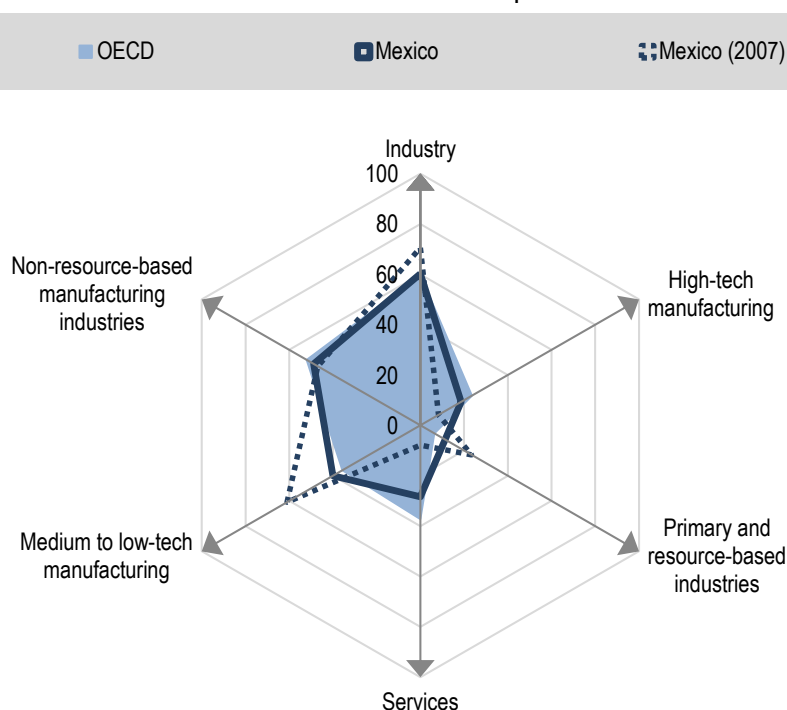
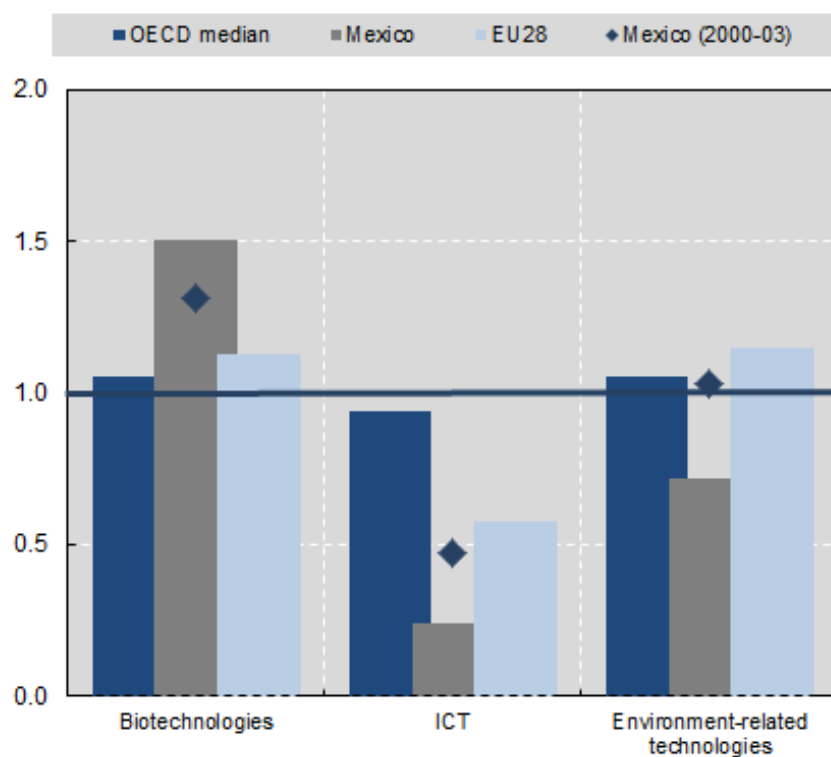


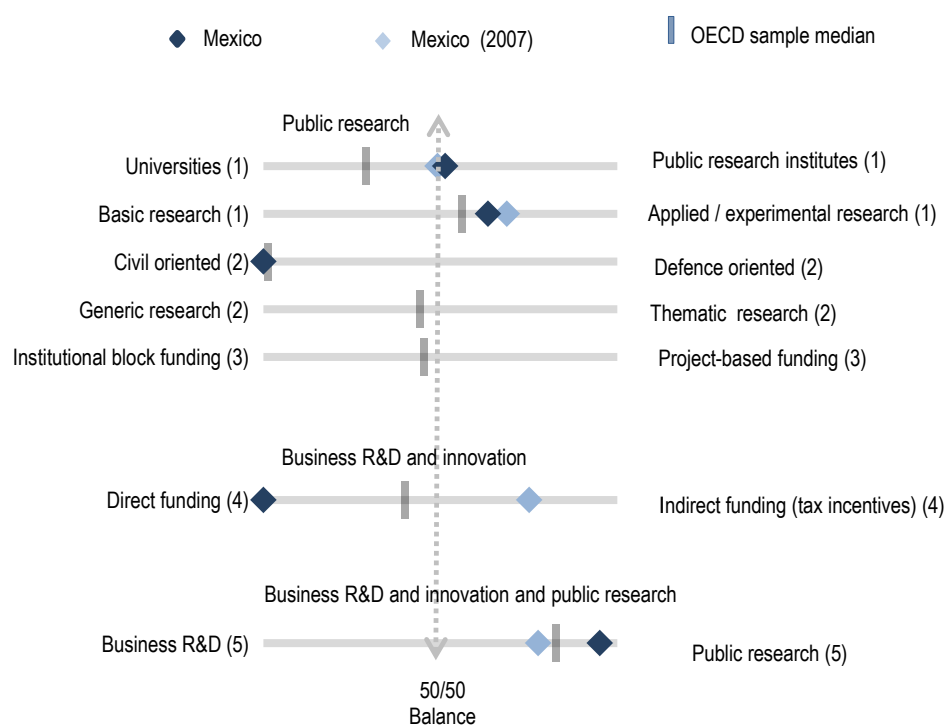


Figure 7. Revealed technology advantage in selected fields, 2011-13
Index based on IP5 patent families applications



National STI policy mix

Figure 8. Allocation of public funds to R&D, 2014 or latest year available
By sector, type of R&D and mode of funding



(1) Balance as a share of both higher education (HERD) and government (GOVERD) R&D expenditure.

(2) Balance as a share of total government budget appropriations and outlays for R&D (GBAORD).

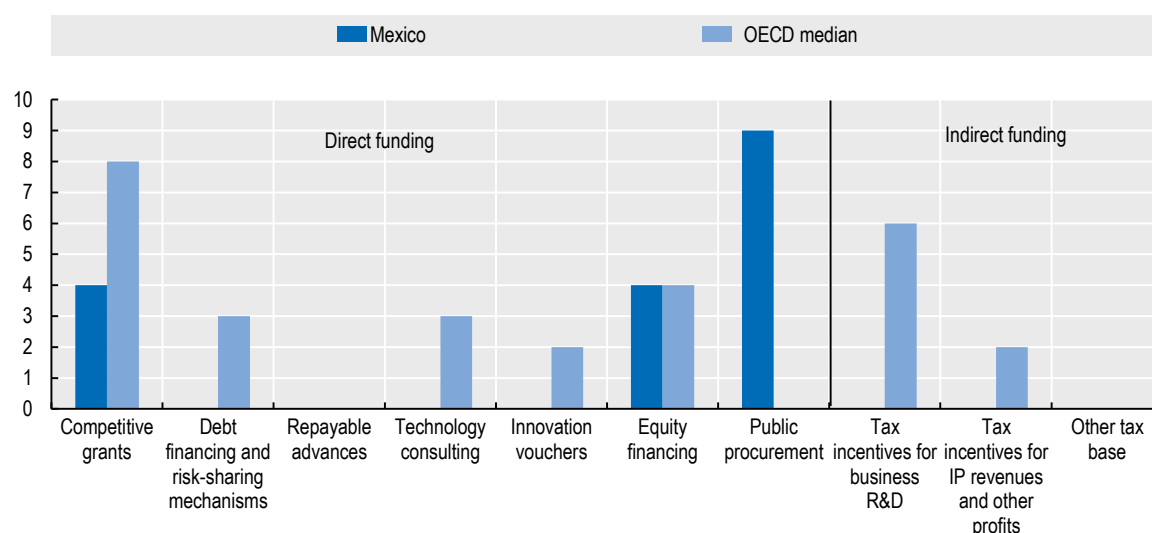
(3) Balance as a share of total funding to national performers.

(4) Balance as a share of both indirect funding (through R&D tax incentives) and direct funding (through grants, procurement, loans, etc.).

(5) Balance as a share of publicly-funded HERD and GOVERD and components of (4).

Figure 9. Most relevant policy instruments of funding for business R&D, 2016

Country self-assessment, index (9 = high and increasing relevance to 0 = not used)



Note: Note: Policy information comes from country responses to the OECD STI Outlook policy questionnaires 2016 and 2014. Mexico's responses are available in the EC/OECD STI Policy Database, edition 2016 at http://qdd.oecd.org/DATA/STIPSurvey/MEX...STIO_2016.


Source: See the reader's guide and methodological annex.

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References

General references

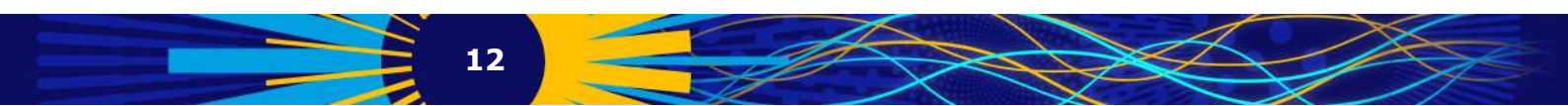
- Dernis H., Dosso M., Hervás F., Millot V., Squicciarini M. and Vezzani A. (2015), World Corporate Top R&D Investors: Innovation and IP bundles, A JRC and OECD common report, Luxembourg, Publications Office of the European Union.
- EC (European Commission) (2015), EU R&D Scoreboard: The 2015 EU Industrial R&D Investment Scoreboard, European Commission, Luxembourg, <http://iri.jrc.ec.europa.eu/scoreboard.html>, accessed 4 October 2016.
- Flanagan, K., E. Uyarra and M. Laranja (2010), "The policy mix for innovation: rethinking innovation policy in a multilevel, multi-actor context", Munich Personal RePEc Archive (MPRA) No. 23567, July.
- IEA (2015), CO₂ Emissions from Fuel Combustion 2015, OECD Publishing, Paris, DOI: http://dx.doi.org/10.1787/co2_fuel-2015-en

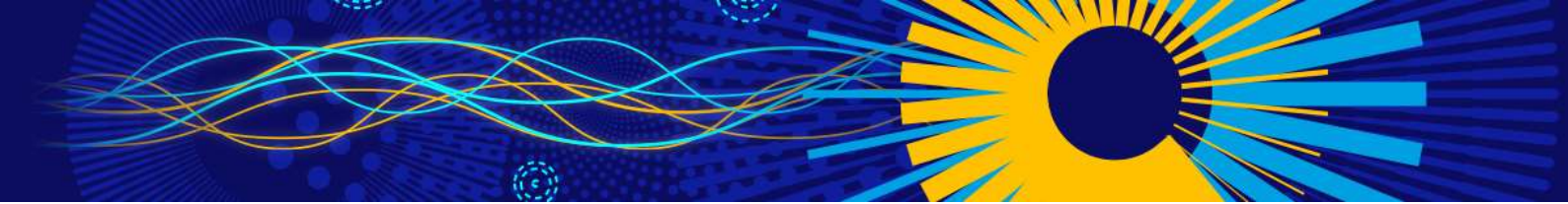
- 
- Kergroach, S. (2010), "Monitoring innovation and policies: developing indicators for analysing the innovation policy mix", internal working document of the Directorate for Science, Technology and Industry (DSTI), OECD, Paris.
- Kergroach, S., J. Chicot, C. Petrolis, J. Pruess, C. van Ooijen, N. Ono, I. Perianez-Forte, T. Watanabe, S. Fraccola and B. Serve, (forthcoming-a), "Mapping the policy mix for innovation: the OECD STI Outlook and the EC/OECD International STIP Database", OECD Science, Technology and Industry Working Papers.
- Kergroach, S., J. Pruess, S. Fraccola and B. Serve, (forthcoming-b), "Measuring some aspects of the policy mix: exploring the EC/OECD International STI Policy Database for policy indicators", OECD Science, Technology and Industry Working Papers.
- OECD (Organisation for Economic Co-operation and Development) (2016), Education at a Glance 2016: OECD Indicators, OECD Publishing, Paris, <http://dx.doi.org/10.1787/eag-2016-en>.
- OECD (2016), OECD Economic Outlook, Volume 2016 Issue 1, OECD Publishing, Paris, http://dx.doi.org/10.1787/eco_outlook-v2016-1-en.
- OECD (2016), OECD Country Reviews of Innovation Policy, www.oecd.org/sti/inno/oecdreviewsofinnovationpolicy.htm.
- OECD (2015), Pensions at a Glance 2015: OECD and G20 indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/pension_glance-2015-en.
- OECD (2015), OECD Skills Outlook 2015: Youth, Skills and Employability, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264234178-en>.
- OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_scoreboard-2015-en.
- OECD (2015), OECD Digital Economy Outlook 2015, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264232440-en>.
- OECD (2015), Entrepreneurship at a Glance 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/entrepreneur_aag-2015-en.
- OECD (2015), National Accounts at a Glance 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/na_glance-2015-en.
- OECD (2015), The Innovation Imperative: Contributing to Productivity, Growth and Well-Being, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264239814-en>.
- OECD (2014), Measuring the Digital Economy: A New Perspective, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264221796-en>.
- OECD (2014), OECD Science, Technology and Industry Outlook 2014, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_outlook-2014-en.
- OECD (2011), Towards Green Growth: Monitoring Progress: OECD Indicators, OECD Green Growth Studies, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264111356-en>.
- OECD (2010), "The Innovation Policy Mix", in OECD Science, Technology and Industry Outlook 2010, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_outlook-2010-48-en.
- OECD (2010), Measuring Innovation: A New Perspective, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264059474-en>.
- OECD and SCImago Research Group (CSIC), (2014), Compendium of Bibliometric Science Indicators 2014, <http://oe.cd/scientometrics>.
- Van Steen, J. (2012), "Modes of public funding of R&D: Towards internationally comparable indicators", OECD Science, Technology and Industry Working Papers, No. 2012/4, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k98ssns1qzs-en>.
- 



Databases and data sources

- Academic Ranking of World Universities (2016), “Shanghai ranking academic ranking of World universities”, www.shanghairanking.com, accessed 4 October 2016.
- Bureau Van Dijk (2011), ORBIS Database, Bureau Van Dijk Electronic Publishing.
- EC/OECD (forthcoming), International Database on Science, Technology and Innovation Policies (STIP), edition 2016, www.innovationpolicyplatform.org/ecoecd-stip-database.
- Elsevier B.V. (2014), Elsevier Research Intelligence, www.elsevier.com/online-tools/research-intelligence/products-and-services/scival, accessed 4 October 2016.
- Eurostat (2016), Education and Training Databases, June, <http://ec.europa.eu/eurostat/web/education-and-training/data/database>, accessed 4 October 2016.
- Eurostat (2016), Total intramural R&D expenditure (GERD) by sectors of performance and source of funds, April, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdfund&lang=en, accessed 4 October 2016.
- Graham, S., G. Hancock, A. Marco and A. Myers (2013), “The USPTO Trademark Case Files Dataset: Descriptions, Lessons, and Insights”, SSRN Working Paper, <http://ssrn.com/abstract=2188621>.
- IEA (International Energy Agency) (2015), CO2 Emissions from Fuel Combustion Database, www.iea.org/publications/freepublications/publication/name,43840,en.html.
- ILO (International Labour Organization) (2016), Key Indicators of the Labour Market database, www.ilo.org/global/statistics-and-databases/research-and-databases/kilm/lang--en/index.htm, accessed 4 October 2016.
- IMF (International Monetary Fund) (2016), World Economic Outlook (WEO) Databases, July, www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx, accessed 4 October 2016.
- ITU (International Telecommunication Union) (2016), World Telecommunication/ICT Indicators 2016, www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, accessed 4 October 2016.
- OECD (2016), Activity of Multinational Enterprises (AMNE) Database, August, www.oecd.org/industry/ind/amne.htm.
- OECD (2016), ANBERD Database, July, www.oecd.org/sti/anberd.
- OECD (2016), OECD Annual Labour Force Statistics Database, July, www.oecd.org/employment/labour-stats.
- OECD (2016), Broadband Portal, August, www.oecd.org/sti/broadband/oecdbroadbandportal.htm.
- OECD (2016), OECD Education Databases, September, <http://gpseducation.oecd.org>.
- OECD (2016), Entrepreneurship Financing Database.
- OECD (2016), Educational Attainment and Labour Force Status Database, <https://data.oecd.org/education.htm>.
- OECD (2016), OECD Income Distribution Database, www.oecd.org/social/income-distribution-database.htm.
- OECD (2016), Main Science and Technology Indicators (MSTI) Database, June, www.oecd.org/sti/msti.
- OECD (2016), OECD National Accounts Databases, September, www.oecd.org/std/na.
- OECD (2016), OECD/NESTI data collection on R&D tax incentives, July, www.oecd.org/sti/rd-tax-stats.htm.
- OECD (2016), Patent Database, June, www.oecd.org/sti/inno/oecdpatentdatabases.htm.
- OECD (2016), Productivity Database, September, www.oecd.org/std/productivity-stats.
- OECD (2016), Programme of International Students Assessment (PISA) Database, OECD Education Statistics, June, www.pisa.oecd.org.





- OECD (2016) Programme for the International Assessment of Adult Competencies (PIAAC) Database, OECD Education Statistics, June www.oecd.org/skills/piaac/surveyofadultskills.htm.
- OECD (2016), Research and Development Statistics (RDS) Database, April, www.oecd.org/sti/rds.
- OECD (2016), STI Micro-data Lab: Intellectual Property Database, June, <http://oe.cd/ipstats>.
- OECD (2014), Product Market Regulation (PMR) Database, March, www.oecd.org/economy/pmr.
- OECD (2013), “Modes of public funding of R&D: Interim results from the second round of data collection on GBAORD”, internal working document of the Working Party of National Experts on Science and Technology Indicators (NESTI), OECD, Paris.
- UIS (UNESCO Institute for Statistics) (2016), Education Database, June, http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS, accessed 4 October 2016 .
- UIS (2016), Science, Technology and Innovation Database, July, http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS, accessed 4 October 2016.
- UN (United Nations) (2016), UN e-Government Survey, United Nations, NY. <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2016> (accessed 4 October 2016).
- World Bank (2016), World Development Indicators (WDI) Databank, <http://wdi.worldbank.org>

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