R&I and Infrastructure Report

Research and Innovation Policy

Sustainable Governance Indicators 2019

SGI Sustainable Governance Indicators

BertelsmannStiftung

Indicator

R&I Policy

Question

To what extent does research and innovation policy support technological innovations that foster the creation and introduction of new products?

41 OECD and EU countries are sorted according to their performance on a scale from 10 (best) to 1 (lowest). This scale is tied to four qualitative evaluation levels.

10-9 = Research and innovation policy effectively supports innovations that foster the creation of new products and enhance productivity.
8-6 = Research and innovation policy largely supports innovations that foster the creation of new products and enhance productivity.
5-3 = Research and innovation policy partly supports innovations that foster the creation of new products and enhance productivity.
2-1 = Research and innovation policy has largely failed to support innovations that foster the creation of new products and enhance productivity.

Israel

Score 10

Israel's research and development (R&D) sector is based on three pillars: scientific research performed primarily in academia, research conducted in government institutes, and research conducted by civil-industrial partnerships overseen the by Ministry of Finance. For many years, Israel has led the world in research and development (R&D) investment, spending more on R&D as share of GDP than any other developed country. The country was ranked 11 out of 126 countries in the 2018 Global Innovation Index, a considerable improvement over the 16th place it held in 2017.

In 2014 the government's social-economic cabinet approved the establishment of aimed to encourage technological innovation. The Israel Innovation Authority began its activity in early 2017. The authority was established based on the model of the Office of the Chief Scientist in the Israeli Ministry of Economy and Industry, with the goal of implementing the R&D law, and providing high-quality and effective services for the Israeli innovation ecosystem. The authority had a budget of close to ILS 200 million in 2017, but used only ILS 100 million of it.

A large portion of Israel's R&D policy is directed toward international cooperation. In 2011, Israel was engaged in 30 different international cooperative research ventures with a variety of European countries and organizations. These resulted in 250 grant applications and projects with a total budget of €1.35 billion by 2017, while the return to Israeli entities in the form of grants reached €1.7 billion. Israel is also signatory to 29 bilateral R&D agreements, which fund around 100 new projects each year, and is involved in five EU programs, including Eureka, Eurostars, the Competitive and Innovation Program – Enterprise Europe Network (CIP-EEN),

Galileo, and Sesar. In terms of both policy and budgets, the most significant international involvement is through framework programs, such as Horizon 2020, which are managed by the Israel-Europe R&D Directorate (ISERD).

Israel produces a large number of new and important patents every year, mainly in the fields of science and technology. It is a signatory to the Patent Cooperation Treaty. In 2017, the number of patents approved in Israel decreased by 19% - from 813 in 2016 to 660 in 2017.

Although the state of innovation in Israel is good, a comparative study from the Samuel Neaman Institute found that the rate at which research output grows in Israel is lower than in similar small, high-innovation countries like Belgium and Singapore. This trend might lead to a future decline in Israel's status as a highly innovative country. The study points to the declining share that academic research accounts for within total (civilian) R&D investment as a possible cause for this development.

Citation:
Cocco, Federica, "How Israel is leading the world in R&D investment," Financial Times, 8.2.2017: https://www.ft.com/content/546af0b2-ede5-11e6-930f-061b01e23655

Public announcement from Israel central statistics bureau, "Survey of Knowledge Commercialization Companies in Israel 2017 Reports on Inventions, Patents, License Agreements, Income and Startup Companies," 27.08.2018 (Hebrew):
http://www.cbs.gov.il/reader/newhodaot/hodaa_template.html?hodaa=201812257

"The CEO of the social-economic cabinet approved the establishment of an authority for technological innovation," Minister of the Economy website 15.9.2014: http://economy.gov.il/Publications/PressReleases/Pages/CabinetForTechnologicalIn novation.aspx (Hebrew)

The R&D fund – Support to Research and Technological Innovations, "The Ministry of Economy and Industry website (Hebrew)

Robin, Aliran, "The Budget of the Israel Innovation Authority will be cut in 100 Million Shekels," The Marker, 11.8.16: (Hebrew) http://www.themarker.com/technation/1.3036681 "2016 Israel Innovation Authority Report Presented to Prime Minister," 29.6.2016: http://www.imra.org.il/story.php3?id=70918

Israel Innovation Authority. "Innovation Report 2018."
https://innovationisrael.org.il/en/report/innovation-report-2018

Israel Innovation Authority, "Report 2017,"
http://economy.gov.il/English/NewsRoom/PressReleases/Documents/2017IsraelInnovationAuthorityReport.pdf

Dutta, Soumitra, Bruno Lanvin, and Sacha Wunsch-Vincent (Editors), "The Global Innovation Index 2017. Innovation Feeding the World," https://www.globalinnovationindex.org/gii-2017-report

Cornell University, INSEAD, and WIPO, "The Global Innovation Index 2018: Energizing the World with Innovation," Ithaca, Fontainebleau, and Geneva, 2018: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf

Getz, Daphne, Lavid, Noa and Barzani, Ella. "R&D Outputs in Israel: International Comparison of Scientific Publications," 2017, Haifa: Samuel Neaman Institute, 2018. https://www.neaman.org.il/EN/R-D-Outputs-in-Israel-International-Comparison-of-Scientific-Publications-2017

"Operational budget for the Israel Innovation Authority," Key to Israel's Budget, 11.10.2018 (Hebrew):
http://next.obudget.org/i/budget/00383001/2019?li=3

Bilateral Programs, ISRED, 17.10.2018:

http://www.iserd.org.il/binational_programs

"EU – Israel Research and innovation cooperation – 20 years of success, partnership and friendship," The European Commission, 12.01.2017:
https://ec.europa.eu/research/iscp/index.cfm?pg=israel

Sweden

Score 10

Sweden ranks among the top five advanced industrialized democracies on all aspects of research and development (R&D): spending (public and private) per capita; number of researchers; number of patent applications and intellectual ownership licenses. This high level of investment in R&D has existed for considerable time. As an economy with high labor costs, Sweden's competitive edge lies not in large-scale manufacturing but in knowledge-intensive sectors. R&D spending thus directly sustains that competitive edge.

Governments – center-right as well as Social Democratic-Green – rarely miss an opportunity to reinforce the argument that public spending on higher education, research institutions and research and development in general is integral to future prosperity and wealth. There is nothing suggesting that the commitment among all major political players to R&D spending is about to change.

While R&D spending has a long history, converting research and development concepts into valuable products has been far more challenging for Sweden. The "Swedish paradox," as it is called, is precisely the inability to convert research findings into commercially viable products. However, as recent data show, Sweden now ranks first with regard to patent applications and license fees for intellectual property. This is a valid indicator that R&D is bearing fruit, as securing intellectual ownership of emerging products is a critical stage in the process from the research facility to the market. Public policy has targeted this very issue lately and the data suggest that R&D is now increasingly paying off.

Meanwhile, the new era of digital entrepreneurship has seen Sweden emerge as a global center of digital innovation. This applies to digital communication, computer games and IT-based services. The World Economic Forum, which views Sweden's tax levels as burdensome, suggests that the social welfare safety net has made Swedes less risk averse than entrepreneurs in many other countries. Overall, it appears that much of this success can be attributed to deregulation and other pro-business reforms introduced by the 2006 to 2014 center-right government.

Citation:
Digitaliseringskommissionen (2015): Digitalisering, främjande och framtid. En utredning kring behov av digitaliseringsfrämjande insatser (Stockholm) (https://digitaliseringskommissionen.se/wp-content/uploads/2015/02/Digitalisering-fr%C3%A4mjande-och-framtid-Slutlig-februari-2015_korrigerad.pdf).

Edquist, C. and L. Hommen (eds) (2008), Small Country Innovation Systems (Cheltenham: Edward Elgar).

World Economic Forum (12 October 2017), "Why does Sweden produce so many startups?"

Germany

Score 9

Germany's performance in the area of research and development remains positive. According to the World Economic Forum, Germany's capacity for innovation ranks highest among the world's top performers. In the Global Competitiveness Report 2018, Germany ranked 3rd out of 140 countries. Furthermore, Germany ranked 5th out of 140 countries for patent applications per inhabitant, a two-position improvement over the previous year. For the quality of scientific research institutions, Germany ranked 4th out of 140 countries, a strong improvement over 2017 when Germany ranked only 11th out of 140 countries.

Regarding funding, the German government continues to increase budgets on research and development. Its spending remains above the European average. The budget of the Ministry of Education and Research was increased to €14.0 billion in 2014, €15.3 billion in 2015, €16.4 billion in 2016 and €17.6 in 2017, a record level. In 2018, the budget will remain the same amount, increasing in 2019 to €18.3 billion.

In contrast to numerous other European countries, Germany does not offer general R&D tax incentives, but rather concentrates on targeted funding of specific programs. Companies' expenditures on R&D are strong, but public-private partnerships and collaboration between universities and industry leave room for improvement. The government has decided to continue its support for top research and education in the tertiary education sector through the so-called Excellence Strategy from 2019 onward, which will follow the earlier "Excellence Initiatives." While the Excellence Strategy supports university research, the Joint Initiative for Research and Innovation strengthens the non-university research institutes. All these measures appear to have slightly improved the quality of scientific research institutions. In the Global Competitiveness Report 2018, Germany performed well in higher education and training. However, concerning digital skills among the population, Germany only ranked 16th out of 140 countries.

Citation:
Global Competitiveness Report 2018. World Economic Forum.

Bundesministerium für Bildung und Forschung – BMBF (2018):
https://www.bmbf.de/de/der-haushalt-des-bundesministeriums-fuer-bildung-und-forschung-202.html

Netherlands

Score 9

In 2018, the European Innovation Scoreboard has the Netherlands as an innovation leader, ranked fourth after Finland, Denmark and Sweden). The Netherlands ranked 6 out of 138 economics in the World Economic Forum's Global Competitiveness Report 2017 and was the third most competitive economy in Europe. The

Netherlands scores above average in terms of open, excellent and attractive research systems, as well as in scientific-publication output, finances and support. Its weakness is in financial market development (with low scores for perceived efficiency, and confidence and trust in the financial sector), sales and intellectual assets.

It is unclear whether the Netherland's R&D performance is due to government policies (coordinated by the Ministry of Economic Affairs and Climate). The country's policymakers aim to ensure that the Netherlands is one of the top five global knowledge economies, and to increase public and non-public R&D investments to 2.5% of GDP (€650 billion). The first of these two goals was achieved and has been sustained since 2015. However, the second goal is yet to achieved, with total expenditure on R&D as a percentage of GDP stuck at 2%, lower that the EU ambition of 3%. The most recent figures, compiled by the Rathenau Institute, indicate that public and especially private R&D expenditure are lagging. Although government spending on public research institutes has remained at the level of 2014, financial support for free academic research is decreasing. The government also announced cuts to the Ministry of Education's budget of €183 million, sparking mass protests from academic researchers.

Dutch policies used to focus on the reduction of coordination costs in creating public/private partnerships. In addition, there are increasing amounts of money in innovation credits for start-up companies and R&D-intensive SMEs – four to five times as much as for larger companies. However, SMEs struggle with obtaining access to bank credits and navigating their way through a maze of regulatory details in obtaining state funds for innovation. Since 2011, national R&D has focused on nine economic sectors identified as a top priority. In its newly launched Mission Driven Innovation Policy, the government intends to focus more on societal challenges like sustainable food production and financially accessible health care. Innovative SMEs and startups have a special place in this new initiative.

Citation:
Rathenau Instituut, Voorpublicatie Totale Investeringen in Wetenschap en Innovatie (TWIN) 2015-2021, (rathenau.nl, accessed 27 september 2017)

Rathenau Instituut, Balans van de wetenschap, 2018 (rathenau.nl, accessed 24 October 2018)

Rathenau Instituut, Bericht aan het Parlement, 30 March 2018

European Commission, Innovation Union Scoreboard 2018 (ec.europa.eu, accessed 24 October 2018)

World Economic Forum,The Global Competitiveness Report 2018 (reports.weforum.org, accessed 24 October 2018)

Topsectoren, Kabinet: innovaties en topsectorenbeleid richten op maatschappelijke uitdagingen, 13 July 2018 (rijksoverheid, accessed 24 October, 2018)

D. Lanser en H. van der Wiel (2011), Innovatiebeleid in Nederland: de (on)mogelijkheden van effectmeting, CPB Achtergronddocument (www.cpb.nl/sites/default/files/publicaties/download/cpb-achtergronddocumenten)

South Korea

Score 9

The South Korean government invests heavily in research and development (R&D), particularly in fields which can be directly commercialized. The current government plans to unify previously fragmented policies in the area of R&D. A presidential committee on the so-called Fourth Industrial Revolution will be established, and President Moon has said his administration will seek to actively harness new technologies and spur innovation in order to create new jobs. According to the 2018 budget allocation and adjustment plan, significant investments will be made in core technologies, including artificial intelligence. The budget for research and development (R&D) will be about KRW 920 billion, a 20% increase from 2017. Korea has an excellent research infrastructure, with many world-class universities and research institutes that produce internationally competitive research and patents. What impedes innovation is mostly the Korean market's oligopolistic structure, which makes it difficult for entrepreneurs and SMEs to succeed. The country has struggled to translate massive investments in research into productivity increases. Bureaucratic regulations remain intact in many areas.

Citation:
Policy Roadmap of the Moon Jae-in Administration, July 19 2017
Se-jung Oh, "The Crisis in South Korea's Manufacturing Sector: Can its Fall be Stopped," EAF Policy Debates, No.102 (August 7, 2018).

Switzerland

Score 9

Switzerland's achievement in terms of innovation is considerable. It spends 3.4% of GDP (2015) on research. In the period between 2000 and 2015, the growth rate of expenditures on R&D exceeded the growth rate of GDP. Standardized by the number of inhabitants, Switzerland is an international leader in patent applications, with strengths in health technologies and biotechnology. A total of 71% of research spending is corporate spending with the direct aim of economic innovation, an important factor in the country's strong overall competitiveness. With a share of about 29%, public research funding plays a lesser role than in other European countries and depends on five main actors: the cantonal universities, the two federal institutes of technology, the National Science Foundation, the Federal Commission for Technology and Innovation, and the academies of sciences. These actors are independent of each other but cooperate based on complementarity and (limited) competition. The various institutions are highly autonomous, and research policies and processes are driven by bottom-up operations. Thus, Swiss research policy is not centralized, but rather relies on a concept of decentralized innovation with periodic intervention by the federal government. The output of the research system is impressive. The Federal Institutes of Technology Zürich and Lausanne belong to the top-ranked universities in the world, and the universities of Basel, Bern, Geneva and Zürich regularly appear on the list of the 150 best universities worldwide.

Some deficits persist, however, such as coordination among universities and the new universities of applied sciences as well as the weakness in social science and humanities research relative to that conducted in the natural sciences and technologically.

In 2016, the federal government defined its research and innovation goals for the coming four years: increased support for (1) continuing education in vocational training, (2) young academics, (3) training in medicine and (4) innovation. The resources for education, research and innovation should grow by 2% annually.

Citation:
BfS 2017 R-D en Suisse 2015. Finances et personnel, Neuchatel: BfS

France

Score 8

Having improved since 2007, France performs well in research and development policy. According to the EU Innovation Scoreboard 2018, France is ranked 11 out of 28 EU member states with respect to innovation capacity. In the report's global innovation index, France performs slightly above the EU average and is ranked in the group of "strong innovators," behind the group of "innovation leaders." Overall spending on research and development represents 2.22% of GDP (2016), below the OECD average and far from the EU target of 3%. Whereas public spending is comparable to the best-performing countries, private spending remains less strong. France's main relative weaknesses are its low private investment, and limited broadband penetration, intellectual assets and employment in fast-growing enterprises.

On the positive side, the measures taken by the Hollande administration have fostered the dynamics of new technology-based firms (startups). According to the Deloitte Technology Fast 500 Index, in the past four years, France has featured the highest number of fast-growing startups in the last years (97 in 2017, compared to 92 for the United Kingdom, 50 for the Netherlands and 48 for Sweden). The Macron government has adopted further legal and fiscal policy measures that aim to boost the birth and growth of startups.

However, barriers to innovation still exist. Cooperation between academic institutions and businesses is still restricted by cultural traditions, such as a lack of investment by small-and medium-sized companies and the reluctance of researchers to invest in policy-relevant or applied research. Productivity levels and public research could also be improved. However, the development of public-private initiatives as well as the launching of incubators by private investors are improving the quantity and quality of initiatives and investments, in particular in new technologies.

The Macron government has decided to give a major boost to research and innovation not only by supporting the development and growth of startups but also by dedicating €50 billion to this objective over the next five years. The money should not come from new taxes but, for a large part, from the selling of non-strategic assets owned by the state. However, the funding of public research in the big research institutions (e.g., CNRS) is still insufficient to compete with the leading countries.

Citation:
European Innovation Scoreboard 2018
(https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en)

Deloitte: 2017 Technology Fast 500 Europe, Middle East, Africa
(https://www2.deloitte.com/global/en/pages/technology-media-and-telecommunications/articles/technology-fast-500-emea.html)

Luxembourg

Score 8

With regard to its Europe 2020 strategy, Luxembourg set a goal of raising public expenditure on research and innovation to between 2.3% and 2.6% of GDP, of which 0.7 to 0.9 percentage points are earmarked for public use (0.73% in 2015) and 1.6 to 1.7 percentage points earmarked for private research. The overall European goal is 3% of GDP.

Luxembourg supports private research projects: innovation and research can benefit from financial support up to 35%. Private sector innovation can receive grants up to 50% and feasibility studies up to 75% of funding.

Luxembourg has a high proportion of high-skilled workers, with 59.5% of jobs demanding a high level of education or training. More than 40% of the working age population has achieved a tertiary level of education and/or is employed in the science and technology sector. This creates synergies between public research and industry. Luxembourg ranks among the top ten on the Innovation Output sub-index and is number 12 in the overall assessment of the 2017 Global Innovation Index (GII).

In the World University Rankings of 2018, the University of Luxembourg ranked 179 out of 1,000 universities. The new Belval campus, designed for 7,000 students, 3,000 researchers and about 6,000 residents, is one of the largest urban conversion projects in Europe. The relocation to Belval (with the exception of parts of the Faculty of Law, Economics and Finance) will be completed in 2019.

However, the campus has failed architecturally and looks quite sterile. The university does not own the buildings, but has to rent them from a “Belval Fund (Le Fonds Belval)” and conflicts exist between the two institutions. The lack of a university atmosphere in Belval may undermine the university’s ability to attract professors and students from outside the country.

Citation:
"2018 Index of Economic Freedom." Heritage. https://www.heritage.org/index/pdf/2018/book/index_2018.pdf. Accessed 23 Oct. 2018.

"Uni.lu: Unistart dürfte Investitionen in Belval Auftrieb verleihen." https://www.wort.lu/de/lokales/uni-lu-unistart-duerfte-investitionen-in-belval-auftrieb-verleihen-55fc3c7d0c88b46a8ce60554. Accessed 8 Nov. 2018.

"Country information – Luxembourg." European Commission. www.ec.europa.eu/digital-single-market/en/country-information-luxembourg. Accessed 23 Oct. 2018.

"World University Rankings 2018 – 2019." Times Higher Education. https://www.timeshighereducation.com/world-university-rankings/2018/world-ranking#!/page/0/length/-1/sort_by/rank/sort_order/asc/cols/stats. Accessed 23 Oct. 2017.

Canada

Score 7

Canada's economic and policy environment is conducive to innovation and investments in productivity growth. Despite this, a 2015 report from the federal government's Science, Technology and Innovation Council found that the country continues to lag behind other countries when it comes to key innovation measures like filing patents, and corporate spending on research and development. In 2017, the government announced CAD 950 million funding support for "innovation superclusters" to help drive innovation, R&D and economic growth. In addition, a Strategic Innovation Fund with a budget of CAD 1.26 billion over five years was created to allocate to firms across Canada's industrial and technological sectors.

How effective government policy is in encouraging R&D investment and productivity gains remains, however, contentious. Neither the federal government's Scientific Research & Experimental Development program (a tax program to increase business-sector R&D) nor the impact of budget cuts for government R&D labs have ever been formally evaluated. Critics have also pointed to the inadequacy of government programs to facilitate technology transfers, and persuade small and medium-sized businesses to adopt best practices. Finally, increased rates of higher education participation have failed to yield increased business sector R&D and productivity.

Public policy in Canada continues to encourage a strong research capacity in the academic sector. In September 2012, the Council of Canadian Academies released an assessment of science and technology in Canada, based on a survey of over 5,000 leading international scientists, that found the country's scientific research enterprise to be ranked fourth-highest in the world, after that of the United States, the United Kingdom and Germany. In 2018, a new assessment was released, indicating that Canada remained in high standing for research output, but was behind the world average for R&D investment.

Citation:
Council of Canadian Academies (2012) Expert Panel Report on the State of Science and Technology in Canada, September, http://www.scienceadvice.ca/uploads /eng/assessments%20and%20publicatio

ns%20and%20news%20releases/sandt_ii /stateofst2012_fullreporten.pdf

Council of Canadian Academies (2018) Competing in a Global Innovation Economy: The Current State of R&D in Canada, Ottawa (ON): Expert Panel on the State of Science and Technology and Industrial Research and Development in Canada. http://new-report.scienceadvice.ca/assets/report/Competing_in_a_Global_Innovation_Economy_FullReport_EN.pdf.

Greenspon, Jacob and Erika Rodriques (2017) "Are Trends in Patenting Reflective of Innovative Activity in Canada?" CSLS Research Report 2017-01, January http://www.csls.ca/reports/csls2017-01.pdf

Murray, Alexander (2016) "Developing an Inclusive Innovation Agenda for Canada," report prepared for Innovation, Science and Economic Development Canada CSLS Research Report 2016-18, December http://www.csls.ca/reports/csls2016-18.pdf.

Science, Technology and Innovation Council (2013) Canada's Science, Technology and Innovation System: Aspiring to Global Leadership, State of the Nation, 2012, May http://www.stic-csti.ca/eic/site/st ic-csti.nsf/eng/h_00058.html

Science, Technology and Innovation Council (2015) Canada's Innovation Challenges and Opportunities, State of the Nation, 2014, http://www.stic-csti.ca/eic/site/stic-csti.nsf/vwapj/STIC_1500_SON_Report_e_proof4.pdf/$FILE/STIC_1500_SON_Report_e_proof4.pdf

Denmark

Score 7

Among OECD countries, Denmark has the fourth highest ratio of public R&D spending to GDP, and seventh highest submission rate of patent applications.

The target for R&D investments is 3% of GDP. This figure was actually reached in 2009, with 1.02% public and 2.1% private research investments. Since Danish businesses are less innovative than foreign competitors, the Social Democratic-led government took various initiatives, including the creation of a Business Innovation Fund as well as a Globalization Fund.

The Liberal government that came to power in June 2015 set a target of 1% of GDP for publicly funded research. Though the government subsequently cut public spending on research and education. Spending was reduced in 2016, while further cuts were announced for 2017 to 2020. Public debate about these cuts has been vivid, particularly regarding how these cuts relate to the government's aim to strengthen productivity and increase competitiveness.

Citation:
World Economic Forum, The Global Competitivenes Report 2017-2018. http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf (accessed 5 November 2017).
Produktivitetskommissionen: www.produktivitetskommissionen.dk

Finland

Score 7

Finland was earlier among the forerunners in research and development (R&D) spending as well as in the number of researchers and patent applications. Indeed, in 2014, Finland had the European Union's highest R&D intensity, followed by

Sweden and Denmark. However, this lead position subsequently declined in the wake of weakening economic prospects. Although allocations for R&D activities in the 2018 budget increased by €85.7 million from the previous year, the share of public research funding in GDP remained the same as in the previous year (i.e., 0.8%). The innovation system's low level of internationalization is a particular weakness. Moreover, the focus of R&D has been on applied research, with basic research at universities and other institutes benefiting little. Undermining commitments laid out in the government program, the Sipilä government has repeatedly carried out dramatic cuts in government spending for education and higher learning. In the long run, given the obvious dependence of applied research on basic-research developments, the heavy bias in favor of applied research and the continuing neglect of the financial needs of schools and higher learning institutions will carry negative consequences for product development and productivity. Furthermore, the system of technology transfer from universities to the private sector is comparatively weak, and academic entrepreneurship is not well developed.

Citation:
"Research and Innovation Policy Guidelines for 2010-2015". The Research and Innovation Council of Finland, 2010. http://www.minedu.fi/export/sites/default/OPM/Tiede/tutkimus-_ja_innovaationeuvosto/julkaisut/liitteet/Review2011-2015.pdf
"Statistics Finland - Science, Technology and Information Society - Research and Development", www.stat.fi
Data on R&D expenditure; http://ec.europa.eu/eurostat/
https://www.stat.fi/til/tkker/2018/tkker_2018_2018-02-22_tie_001_en.html

Ireland

Score 7

While government policy is supportive of research and innovation by indigenous firms, the most striking success of Irish industrial policy has been in attracting foreign-owned firms in high-tech sectors to Ireland. This trend continued during the economic crisis. Indeed, the inflow of FDI in the IT and pharmaceutical sectors contributed significantly to the economy's strong recovery. The location of these firms in Ireland has created opportunities for innovative small Irish firms to develop technological inputs to supply them.

Ireland's overall information and communication technology (ICT) readiness continues to lag behind most other northern and western European countries as well as Israel. Nonetheless, the World Economic Forum's Competitiveness Report for 2014 ranked Ireland 12th worldwide in terms of "technological readiness," a rise from 17th place in 2012. This rank was maintained in the 2015 report. The Global Enabling Trade Report for 2016 ranked Ireland 20 out of 136 countries in the Enabling Trade Index 2016.

The so-called double Irish tax facility, which provided significant tax incentives for multinational corporations to attribute intellectual property income (wherever its origin) to their Irish subsidiaries, was abolished in the 2015 budget in order to avert EU penalties over illegal state aid to industry. In the 2016 budget, the minister for

finance announced some details of a new “knowledge box” scheme to partially replace this facility. This provides for a 6.25% corporate tax rate on profits arising from “certain patents and copyrighted software which are the result of qualifying R&D carried out in Ireland.” The Irish government intends to remain in the forefront in the competition to attract R&D-intensive investment.

Japan

Score 7

Science, technology and innovation (STI) receive considerable government attention and funding. Current policies are based on the Fifth Science and Technology Basic Plan (2016-2020). The government has determined to spend 1% of GDP on science and technology. A major focus is on creating a “super-smart” society, also dubbed Society 5.0. Concrete measures include a reform of the career system for young researchers, an increase in (international) mobility, measures supporting the development of a cyber society, and – as before – the promotion of critical technologies, including defense-related projects considered indispensable for Japan’s security.

The government and outside observers realize that Japan’s strong position among the world’s top technology nations is declining, based on various indicators. A recent government survey even exposed a sense of crisis among the researchers interviewed. Relevant indicators include the often-used Nature Index, which showed a decline in high-quality scientific output of 3.7% in 2017. The ratio of high-quality research output to R&D input is particularly weak. One problem is that researchers find it difficult to pursue long-term projects, as they are pressured to produce short-term results. Another major issue is young researchers’ difficulty in finding stable professional positions. This is one of the problems that the current Basic Plan takes seriously and tries to address.

Citation:
Council for Science, Technology and Innovation/Cabinet Office, Report on the 5th Science and Technology Basic Plan, 18 December 2015

Catherine Armitage, Stalled ambition, Nature Index, 21 March 2018, https://www.nature.com/articles/d41586-018-02895-1

Ichiko Fuyuno, Resistance to reform, Nature Index, 21 March 2018, https://www.nature.com/articles/d41586-018-02896-0

The Japan Times, Review problems in science and technology policy (Editorial), 22 May 2018, https://www.japantimes.co.jp/opinion/2018/05/22/editorials/review-problems-science-technology-policy/

Lithuania

Score 7

Lithuania’s economy is characterized by the exploitation of cheap factors of production rather than innovation-led growth. According to the EU Innovation Scorecard, the country performs below the EU average, falling into the “moderate innovators” group. However, its overall innovation performance has improved since

2008. The country was ranked 40 out of 126 countries assessed in the 2018 Global Innovation Index. The country has set an ambitious target of spending 1.9% of GDP on R&D by the 2020. Although this level had been gradually increasing in recent years, in 2016 Lithuania's R&D investment sharply decreased to 0.74 % of GDP due to falling public investment. Moreover, the share of this sum spent by the business sector was very low (totaling just 0.3% of GDP in 2015), as research and innovation policy is dominated by the public sector and highly dependent on EU funds. Within the country's innovation system, research is oriented only weakly to the market, research products are not supported with sufficient marketing or commercialization efforts, investment is fragmented, funding levels are not competitive with other European states, and enterprises do not participate in international markets to any significant degree, although there are some exceptions demonstrating good practices in the biotechnology and laser industries. The recent OECD review of the country's innovation policy recommended introducing favorable framework conditions for innovation, developing innovation-oriented higher education and skills training, improving governance in the innovation system, balancing the policy mix and supporting international knowledge linkages.

Lithuanian authorities have used EU structural funds to improve the country's R&D infrastructure. So-called science valleys have been developed, integrating higher education institutions, research centers and businesses areas that work within specific scientific or technological areas. However, using this new research infrastructure efficiently remains a major challenge, and cooperation between industry and research organizations remains rather weak. The government has also supported the sector through financial incentives (in particular, an R&D tax credit for enterprises) and regulatory measures. Demand-side measures encouraging innovation are less developed. Excessively bureaucratic procedures are cited by the science and business communities as the main obstacles to research and innovation in Lithuania.

The 2012 to 2016 government developed a new smart-specialization strategy intended to focus resources in science and technology areas in which Lithuania can be internationally competitive, although it has been criticized for investing too heavily in the construction of new buildings and renovation of low-ranking universities' campuses. In 2016, the parliament approved new science and innovation policy guidelines, which were proposed by the president. The guidelines proposed restructuring the research and higher education systems, supporting innovation development, improving coordination of science and innovation policy, and monitoring science and innovation policy implementation. In June 2017, the parliament approved a resolution to optimize Lithuania's state universities. The plan proposed merging the existing state universities into two comprehensive universities in Vilnius and Kaunas, and regional science centers (branches of other Lithuanian universities) in Klaipėda and Šiauliai. However, after intense lobbying by representatives of the existing universities, the initial plan was amended and the ambitions to reduce the number of higher education institutions scaled back. Although the implementation of the optimization plan had produced some results by

the end of 2018 (in terms of consolidating Šiauliai University into Vilnius University and Lithuanian Sports University into the Lithuanian University of Health Sciences), it remains to be seen if these reforms will consolidate funding and talent. Also, in 2018 the Skvernelis government significantly increased the size of stipends for PhD students (to take effective in 2019) to attract more young researchers into the R&I ecosystem.

Citation:
The EU Innovation Scoreboard is available at http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innovation-scoreboard/
COMMISSION STAFF WORKING DOCUMENT, country report Lithuania 2017: https://ec.europa.eu/info/sites/info/files/2017-european-semester-country-report-lithuania-en.pdf
Global Innovation Index 2018 Report: https://www.globalinnovationindex.org/gii-2018-report#
OECD, Review of Innovation Policy: Lithuania, Overall Assessment and Recommendations, June 2016.

United Kingdom

Score 7

The United Kingdom's tradition of being an active player in research and innovation dates back to the Industrial Revolution. The country's clusters of pre-eminent universities have for a long time played an important role in linking cutting-edge academic research with industries such as biotechnology or information and communications technology (ICT). Performance has been weaker in terms of overall R&D spending, which continues to fall well short of EU targets, as well as in the conversion of innovation into sustainable, large-scale production, which holds the potential for long-term profitability. However, it is important to emphasize that the UK economy does not have the industrial base to support a large-scale R&D effort, so it is necessary to look at other indicators, such as ICT spending (which matters more for service industries), to better understand trends in innovation in the United Kingdom.

Over the decades, attempts have been made by successive governments to improve this situation, for example, by targeting weaknesses in technical education on various levels. Recent government initiatives have focused on extending tax credits for R&D, setting up regional Technology and Innovation Centers, investing in digital infrastructure and new university research facilities, as well as establishing Innovate UK to promote economic growth through science and technology.

Despite tentative agreement that the United Kingdom will remain involved in EU research programs, there is still uncertainty about how this will evolve after Brexit and the status of researchers who are EU nationals working in the United Kingdom. This could have an adverse effect on UK universities, although they are lobbying intensively to prevent a negative outcome. While the potential loss of EU funds is not huge, and it has to be recalled that the United Kingdom has always been a net contributor to the EU budget, researchers are more apprehensive about barriers to collaboration with counterparts in the European Union. This all comes despite a year-long debate about how best to attract highly skilled immigrants to the UK

science sector. Yet, the number of EU students applying to UK universities increased by 3% in 2018. University officials interpret the upturn either as a last-minute rush before Brexit or as a sign that the attractiveness of UK universities simply outshines the grim political prospects.

The challenge facing the UK government will be how to maintain its research and innovation effort if obstacles arise to collaboration with other EU member states. This could affect not only the university sector, but also the corporate sector – for example in areas like life sciences and pharmaceuticals where the United Kingdom maintains a prominent research role – if the supply networks of UK research facilities are disrupted.

Citation:
https://www.theguardian.com/education/2018/feb/05/uk-universities-rise-in-applications-eu-students (31.10.18)

United States

Score 7

The United States has traditionally invested heavily in research and development, but the recession and the country's problematic budget politics have compromised this support. Certain public institutions stand out, particularly the National Science Foundation, the several federal laboratories, the National Institute of Health, and research institutions attached to federal agencies. In addition, there is a vast array of federally supported military research, which often has spillover benefits.

Recent demands for spending cuts and the across-the-board sequester cuts have resulted in stagnating federal R&D spending, including in the area of basic science. U.S. government R&D spending has declined as a share of GDP and in comparison both to spending by other countries and by the private sector. In 2016-2017, total U.S. R&D spending was at a record level of $513 billion, while the federal government share of R&D spending was at a historic low, below 25%. Critics have particularly noted the modesty of government funding for energy research, which is critical to the goal of reducing carbon emissions.

In its first two years, the Trump administration has made research and innovation, apart from defense, a low priority. It cut federal R&D spending by about 4.5%, except for Department of Defense R&D, which is projected to increase 15% and includes $2 billion for a new program on artificial intelligence. Trump has cut scientific and engineering personnel in environmental and resource related agencies and withdrawn support for alternative energy development.

Citation:
Congressional Research Service (2017), Federal Research and Development Funding: FY 2018, https://fas.org/sgp/crs/misc/R44888.pdf

Belgium

Score 6

R&D policy is shared between the central government, which can offer tax incentives, and the subnational (regional and community) governments, which are responsible for managing European subsidies and supporting university R&D and related projects. This increases subnational accountability but hurts coordination and limits economies of scale. According to KPMG, a consultancy, Belgium has "increased its attractiveness as a prime location for companies involved in research and development activities and in the exploitation of patents." The country's location, transportation facilities and infrastructure offer considerable advantages to potential investors, KPMG says.

General investment levels have declined across the OECD since the onset of the financial crisis in 2007. Belgium withstood that negative trend comparatively well, with investment as a share of GDP hovering around 23% (comparable to France and Austria, and three points above Germany or the Netherlands, according to IMF data). Specific R&D investment stands at 2.5% of GDP, which is lower than in Germany, Denmark and Austria, but ahead of France, the Netherlands or the EU average (Eurostat data).

In spite of this, Belgium still suffers from a chronic shortage of new and innovative enterprises. Dumont and Kegels (2016) write that "Belgium performed rather well in terms of net job creation over the period 2000 – 2014, in comparison with […] neighboring countries. […] However, our results underline the importance of the decrease in industry-level productivity growth as the main explanation of the aggregate productivity-growth slowdown. […] Belgium stands out unfavorably from other OECD countries, in its low entry of new firms. […] The specific tax benefit for young innovative companies, introduced by the Belgian federal government in 2006, and the Start-up Plan that was initiated in 2015, seem to be good practice in targeting tax incentives on young firms [… It] seems that access to finance is the major barrier for entrants and young firms in Belgium. […] Despite improved fiscal incentives, Belgium remains technologically considerably behind other European countries of a similar size such as Denmark and the Netherlands. While some indicators such as patent registration and monetary returns may be improving, the technological content of the country's exports is progressively eroding. Universities are chronically underfunded […]. This should not overshadow important exceptions; a highly skilled work force is present, and fiscal incentives have attracted some research-intensive firms in the chemical, pharmaceutical, and more recently computer-science sectors (such as Google, in the latter category)."

Citation:
Dumont and Kegels (2016): http://www.plan.be/admin/uploaded/201606240814370.WP_1606.pdf

Eurostat on R&D expenditures:
http://ec.europa.eu/eurostat/tgm/graph.do?tab=graph&plugin=1&pcode=tsc00001&language=en&toolbox=data

IMF for total investment:
http://www.imf.org/external/pubs/ft/weo/2017/02/weodata/weorept.aspx?pr.x=20&pr.y=14&sy=1998&ey=2022&scsm=1&ssd=1&sort=country&ds=.&br=1&c=122%2C124%2C138%2C132%2C134&s=NID_NGDP&grp=0&a

Estonia

Score 6

Research, development and innovation (RDI) are national development priorities, reflected in a sophisticated set of strategies and action plans, and bodies and task forces. The outcomes, however, are poor. Public R&D expenditures remained stagnant between 2016 and 2019, while private sector expenditure amounted to about 40% of total expenditure with no evidence that this share will increase. This is partly explained by EU programming periods as well as the need to increase military expenditures, but crucially also by the government's lack of a clear policy vision. Estonia is one of the few countries worldwide that does not have tax exemptions for enterprise-led R&D activities, nor is there any R&D related risk sharing between public and private sectors. High costs and high risks undermine private sector motivation for investing in R&D.

R&D policy measures have been much more successful in developing scientific research, as indicated by an increased number of highly ranked international publications and the improved international rankings of Estonia's major universities. Advances in the development of patents, high-tech products and services are noticeable but less prominent. R&D personnel are increasingly concentrated in higher education and cooperation with businesses remains limited. Recent changes in research funding policy strongly motivate universities to establish R&D contracts with the private sector. However, this approach discriminates against the social sciences and humanities, which typically serve public and non-profit sector institutions. Total funding for research from the state budget has consistently attracted criticism from universities. However, all main parties pledged to significantly increase research funding at the end of 2018.

Iceland

Score 6

Combined public and private research and development (R&D) expenditure in Iceland totaled 3% of GDP in 2006, one of the highest levels among OECD members. About 40% of this expenditure was provided by the government. This high level of R&D investment reflects the ongoing transformation from an economic focus on agriculture and fisheries toward manufacturing and services. In particular, this has led to the creation of new private firms in the biotechnology, pharmaceutical and high-tech manufacturing sectors. Such export-oriented firms were helped by the depreciation of the króna (which lost a third of its value in real terms following the 2008 crash), but then hurt by the króna's gradual real exchange rate recovery (which recovered its earlier overvalued pre-crash level), before once again benefiting from

the depreciation of the króna during 2018. The economic collapse in 2008 led to a cut in R&D expenditure, which fell to 1.8% of GDP in 2013. According to the most recent available data, R&D expenditure was 2.1% of GDP in 2016, still far below the pre-collapse level. This is evidence of the long-lasting damage caused by the 2008 collapse, which compelled public authorities to drastically cut public expenditure and then change the composition of public spending following the country's recovery – changes that would have been difficult to implement during normal times.

Citation:
Statistics Iceland, http://px.hagstofa.is/pxis/pxweb/is/Atvinnuvegir/Atvinnuvegir__visinditaekni__rannsoknthroun/FYR05101.px/table/tableViewLayout1/?rxid=7cf14630-6835-4bcf-86df-b6e4f6fc92ec. Accessed 21 December 2018.
Rannis (The Icelandic Centre for Research), https://www.rannis.is/starfsemi/arsskyrslur/. Accessed 21 December 2018.

Malta

Score 6

Given Malta's very limited access to natural resources, the country's business R&D sector continues to require substantial development. In previous years, Malta had one of the lowest investment levels in the EU. The National Research and Innovation Strategy highlights the need to increase the R&D knowledge base, particularly by attracting more doctoral and post-doctoral graduates to the area. Nonetheless, there have been some recent improvements, and Malta is actively catching up with the EU average. The 2018 European Innovation Scoreboard classifies Malta as a moderate innovator whose performance has increased relative to that of the EU since 2010. The 2018 European Commission Malta Working Document also highlights the fact that, "improvement in the R&D performance is partly due to sustained efforts by the public authorities to build an R&D system based on indigenous strengths, involving several policy measures to support the emergence of an innovation ecosystem and innovative firms." Nonetheless, the document highlights the fact that structural factors are still hampering the growth of R&D-intensive firms. It adds that intellectual assets and attractive research systems are the strongest innovation dimensions, while finance, support and dimensions are the weakest such dimensions.

A better innovation ecosystem would enhance the capacity of innovative companies to scale up their activities; thus, the government has devised a rolling research and innovation action plan that is intended to reduce fragmentation and overlap. Esplora, Malta's Interactive Science Center, aims to instill a broader interest in science and innovation. Other significant actions include the FUSION program, which focuses on the analyses of companies' or researchers' ideas for commercial viability purposes, the introduction of research clusters (e.g., Malta Marittima), the research framework administered by the Malta College of Arts, Science and Technology (MCAST), the research trust, the Centre for Entrepreneurship and Business Incubation (CEBI) within the University of Malta, the MITA Innovation Hub, and the Malta Life Sciences Park, which provides high-end facilities for the chemistry, biology and digital-imaging sectors.

Citation:
Times of Malta 01/12/17 “Very little being spent on research despite surplus”
Malta Independent 02/12/17 Malta holds position as one of lowest spenders on R&D in the EU
National Research and Innovation Strategy 2020 p.18
European Innovation Scoreboard 2018 p.67
European Semester Thematic Factsheet - Research and Innovation p.9
Commission Staff Working Document - Country Report Malta 2018 SWD (2018) 216 final p.33
http://esplora.org.mt/
http://mcst.gov.mt/ri-programmes/fusion/
National Reform Programme Malta 2018 p. 34
https://www.maltaenterprise.com/industries/life-sciences

New Zealand

Score 6

The OECD has identified deficiencies in the New Zealand government’s commitment to R&D strategies and expenditure, high-technology employment and patent indicators. The problem stems from New Zealand’s small size and geographic isolation, as well as the absence of large companies operating at an international level. While the National-led government increased spending on tertiary training in engineering and science, as well as increasing domestic expenditure on R&D as a percentage of GDP (1.3%), New Zealand is ranked low on these metrics among OECD countries, including that of its closest economic partner, Australia. On 19 April 2018 the Minister for Research, Science and Innovation announced that, from 1 April 2019, a 12.5% tax credit on eligible expenditure would be available for businesses spending more than NZD100,000 a year on R&D. However, critics consider the 12.5% rate inadequate. Moreover, it is felt that the “science test” which determines eligibility will serve as too much of a deterrent, especially for software firms. Other new research and innovation initiatives include a Green Investment Fund of NZD100 million to help the transition to a low-carbon economy and NZD45 million funding toward healthier homes. In addition to allocating over NZD1 billion in R&D tax incentives to encourage business to innovate, the government signaled its focus on lifting R&D spending to 2% of GDP over the next 10 years.

Citation:
Research and Development Survey: 2016. Statistics New Zealand. 29 March 2017. (http://www.stats.govt.nz/browse_for_stats/businesses/research_and_development/ResearchandDevelopmentSurvey_HOTP2016.aspx) (accessed 22 September 2017).
Science Media Centre 2018. BUDGET 2018: Science and Innovation – Expert Reaction. https://www.sciencemediacentre.co.nz/2018/05/17/budget-2018-science-and-innovation-expert-reaction/.

Poland

Score 6

The Polish system for research and development (R&D) has already been significantly restructured since 2010 and has included a move toward more competitive funding. Two R&D agencies respectively for applied and basic research have been created, and efforts have been made to tackle fragmentation by focusing funding on the best-performing institutions. In July 2012, the first six national

leading scientific centers (KNOW) were selected. In its first year in office, the PiS government initiated further measures to foster research at Polish universities and stimulate cooperation between universities and business. In its second year, the government's focus rested on expanding tax incentives for R&D and startups, and on simplifying patent procedures. The amount of tax-deductible R&D spending has increased to 30-50% depending on the size of the company. In addition, the period in which companies may deduct these costs has been expanded from three to six years. The strong reliance on tax relief has been criticized for a lack of efficiency. According to recent empirical research, such a policy might have a greater impact on the economy, but is 2.5 times more costly than additional government spending on R&D,

In May 2017, Minister of Science and Higher Education Jarosław Gowin announced the creation of a National Institute of Technology (NIT), which will bundle the work of 35 existing research institutes. Despite these changes, R&D spending levels in Poland, in both the public and private spheres, remain far below the EU's Europe 2020 target, the innovation capacity of the economy is low and the gender bias in the science sector is high. Partnerships between universities and business have grown, but are still highly dependent on EU funds and personal connections. The introduction of the Lukasiewicz Research Network, which began operating on 1 April 2018, and which connects research institutions and aims at commercializing research funding, represents one attempt to improve this situation.

Citation:
Brandt, N. (2018): Strengthening innovation in Poland, OECD Economics Department, Working Paper No. 1479, Paris.
Zawalińska, K., N. Tran, A. Płoszajc (2018): R&D in a post centrally-planned economy: The macroeconomic effects in Poland, in: Journal of Policy Modeling 40(1): 37-59.

Portugal

Score 6

Portugal's rank in the World Economic Forum's 2018 Global Competitiveness Index remained largely stable compared to the 2017 index, standing at 34 out of 140 countries in 2018, as opposed to 33 out 135 countries in the previous year. It also saw an improvement in its score vis-à-vis 2017. However, while Portugal's score improved in three out of the four index components, it deteriorated in the innovation ecosystem component.

The European Union's 2018 Innovation Scoreboard continues to classify Portugal as a "moderate innovator," the second-lowest category (out of four). Moreover, it shows that Portugal's position continued to decline in relation to the EU average in 2017. Thus, Portugal's performance relative to the EU average in 2017 stood at 80%, a one percentage point decline compared to 2016 and five percentage points below 2010, when it stood at 85%.

Out of the 10 dimensions considered by the 2017 scoreboard, Portugal is above the EU average in three: attractive research systems, innovators and an innovation-friendly environment.

The government is placing a great deal of emphasis on research and innovation, with a particular interest in developing the tech sector. During the review period, Lisbon hosted the Web Summit (5 – 8 November 2018), the largest tech conference in the world, dubbed by Bloomberg the "Davos for geeks." This conference followed the 2016 and 2017 editions, which were also held in Lisbon. Moreover, in October 2018, the government announced a deal that will keep the event in Lisbon until 2028, with a public investment of €110 million over the next 10 years.

This is beginning to have some impact. Lisbon continues to be seen as an attractive destination for startups and is ranked eighth in terms of preferred location by European founders in the 2017 State of European Tech Report. Likewise, the report places Portugal in the top 10 fastest-growing tech worker populations in Europe in 2017.

However, the 2017 State of European Tech Report also highlights the very low position from which Portugal is developing. Thus, consistent with the Innovation Scoreboard results, these tech results and initiatives are not yet percolating fully through to the general economy. The amount of capital invested in tech per capita in Portugal is $4, one of the lowest in the countries analyzed, and well below leading European countries such as Sweden (3), Ireland (1) or the UK ().

Citation:
Atomico & Slush (2017), "The State of European Tech 2017," available online at: https://2017.stateofeuropeantech.com (published on 30 November 2017)

"European Innovation Scoreboard 2017 – Portugal." Available online at: https://ec.europa.eu/docsroom/documents/23935/attachments/1/translations/en/renditions/native

"European Innovation Scoreboard 2018 – Portugal." Available online at: https://ec.europa.eu/docsroom/documents/30696

World Economic Forum (2018), "Portugal: Global Competitiveness Index 4.0 – 2018 edition," available online at: http://reports.weforum.org/global-competitiveness-report-2018/country-economy-profiles/#economy=PRT

Spain

Score 6

Research and technology policy remained a weak point during the period under review, as evidenced by the low number of patents registered, the relatively poor international ranking of universities and the low level of spending on R&D. Investment in R&D accounts in 2018 for just 1.2% of GDP, compared to EU and OECD averages that are above 2%. However, according to the latest report published by Cotec (a Spanish public-private foundation for the promotion of innovation), some positive signs can be identified.

The European Commission's 2018 Innovation Scoreboard stresses that Spain's performance has increased relative to that of 2010 with regard to several indicators, including product, process, marketing and organizational innovation. Human resources, the country's innovation-friendly environment, and its attractive research systems are also strengths underlined by the Commission. However, relative weaknesses remain with regard to finance and innovation support. Spain also came out relatively well in the 2018 Nature Index; here, Spain was the 10th most prolific country worldwide in terms of scientific performance.

The minister for science, innovation, and universities has stressed the need to put R&D back on the political agenda, and in 2018 convened the Council of Universities for the first time since 2011, announcing that it would work intensively to promote internationalization and excellence within the country's R&D ecosystem. The new government also announced that spending on R&D would be increased in 2019 to the levels reached before the crisis.

Citation:
EC(2018), European Innovation Scoreboard
https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en

Cotec(2018), Informe para la innovación
http://informecotec.es/media/Informe-Cotec_2018_versi%C3%B3nweb.pdf

Nature Index(2018)
https://www.natureindex.com/annual-tables/2018/country/all

Austria

Score 5

Public research in Austria is mainly university centered. However, this is a challenging environment, as universities are overburdened by high numbers of students, while researchers in some disciplines are overwhelmed by teaching obligations. The Austrian Academy of Sciences is plagued by insufficient funding. The Austrian Science Fund (Fonds zur Förderung der Wissenschaftlichen Forschung) is tasked with coordinating academic research but has shown only partial success in this task. Research funded by private corporations has little tradition in Austria, and at least in the near future, offers little hope of improving this situation. The deficiencies in public-funded research cannot be counterbalanced by privately funded operations. The whole sector is in acute need of more funding, but the budgetary situation and the growing shift of public funds from the young toward older generations, a trend driven by demographic change, make the outlook quite dire. The government seems to be aware of this critical situation and some steps have been taken to improve the financial situation of universities.

The strong dependence on government funding implies that any new orientation of the incoming government could be decisive. There is an expectation that innovation policy may significantly change. But, at the moment, the focus of the new

government seems to be oriented first and foremost to balancing the budget. This could mean that there will be no significant increase in spending on innovation and research.

This does not prevent excellent research from being conducted in some fields. Important and significant innovations in disciplines such as biological science and medical research are still possible in Austria. The consequences of Austria's membership in the European Union and the European Single Market is opening Austrian universities and other research institutions to non-Austrian scholars. Step by step, this provides a more transnational attitude to research and innovation.

More broadly, links between industry and science are sound, and a high share of public research is funded by industry. In contrast to basic research, industry-sponsored research is mostly aimed at the applied sciences and does not necessarily affect universities. Integration within international networks is strong, and a high share of the labor force is occupied in science and technology-related occupations. Business R&D is particularly strong in niche markets, often performed by specialized small and medium-sized enterprises (SMEs). Other pillars of Austrian business research include large companies, affiliates of foreign corporations and the medium- to low-tech manufacturing sector. Although Austria does not feature any of the world's top 500 corporate R&D investors, there are – according to OECD data – some dynamic startups on the Austrian market. These startups, however, are not a direct result of Austrian research policy.

It currently seems that the new government will continue to improve the financial basis of Austria's universities. Thus, the overall trend (i.e., a gradual improvement in the financial situation of Austrian universities) will continue. Though this does not affect the depth and breadth of research outside the universities, which is still comparatively underdeveloped. Due to European competition, non-university research will probably be strengthened, too.

Chile

Score 5

Research and development (R&D) expenditure as a share of GDP is very low in Chile compared to other OECD countries, and most of this expenditure is undertaken by the government rather than the private sector. But Chile has shown that it is aware of shortcomings regarding the necessities of technological innovation, especially for its future economic and social development. Significant reforms have been put in place to raise R&D funding, including earmarked taxation (a royalty tax on mining), higher government expenditure, and the improvement of tax incentives for private R&D. Although results have to date been disappointing – in large part because of bureaucratic hurdles to the approval of private and public projects – Chilean institutions show good results at least in the area of basic research. But the steps necessary to transform this good basic research into applied research are almost

never taken. Universities are often not prepared to support research that operates at the interface between basic research and industrial development. This is reflected in the comparatively low number of patents registered per year on a per capita basis, whereas the number of scientific publications is relatively high. In general, access to the limited public funds available for research tends to be quite difficult due to high bureaucratic barriers. Despite these facts and considering the development of the last decade, clear improvements regarding innovation policy and scientific cooperation can be observed.

According to the latest version of the Global Innovation Index (2018), Chile is ranked 47 out of 126 countries. In comparison to the previous year, when it was ranked 46 out of 128 countries, the country's innovation performance appears to be stable.

Citation:
http://www.expansiva.cl/media/en_foco/documentos/17032010150429.pdf
http://www.scidev.net/america-latina/innovacion/noticias/tres-paises-lideran-innovacion-en-latinoamerica.html
https://www.globalinnovationindex.org/

Czechia

Score 5

In its last year in office, the Sobotka government committed to expanding government spending on R&D, aiming to reach the EU target for total R&D spending of 2.5% of GDP in 2020. The Babiš government has continued the verbal commitment to R&D. However, past high levels of total spending were heavily dependent on support from EU funds, raising the total to 1.9% of GDP for the 2013-15 period, with a strong emphasis on investment in new facilities that were yet to show benefits in actual research output. There was a small revival in government spending in 2017, bringing total R&D spending back to 1.8% of GDP, which is still below the EU average of 2.0%. The revival in the total reflects a shift in structure with business enterprises increasing their contribution to 57% of the total (against 49% in 2010). Five foreign-owned companies and the automotive sector (which includes vehicle production businesses) accounted for 50% of total research in the business sector. Foreign and domestic businesses alike benefit from indirect subsidization, as 100% of R&D expenditure should be exempt from taxation. Many smaller enterprises complain that this has not happened in practice.

Weaknesses in the R&D area include a perceived lack of government strategy, a failure to attract and retain young, qualified researchers – who benefit from the free movement of people within the EU to find better-paid work in other countries – and a low level of employment for women (23% of researchers in 2017) which suggests a loss of potential and could be a negative effect of poor services to support a work-life balance. Research groups often show little mobility, with the same people staying together throughout their careers and not bringing benefits from experience elsewhere. As a result of these problems, the capacity to take advantage of increased funding opportunities has been limited. Several new programs established by the

Technological Agency (TA ČR) – new competence centers aimed at fostering both research excellence and the application of research results - were unable to redistribute all funds. Similarly, the Grant Agency of Czechia was unable to successfully distribute a significant part of the increased funding.

Italy

Score 5

In recent years, Italian governments' research and innovation policies have been weak, underfunded and not strategically coordinated. The current government has not been able to make much headway in this regard given the tight budgetary context. In spite of complaints from universities, which are severely underfunded compared to other European countries, public funding for universities and R&D has not been increased. The existing policy to link university funding to the quality of research outputs has been continued and slightly strengthened. This policy is intended to incentivize universities to generate more quality research. Fiscal policies to promote investment in technological innovation in industry, introduced in 2016, gained momentum in 2017. The "Piano Nazionale Industria 4.0" program for 2017 to 2020 is an attempt to catch up with the rate of economic innovation in other OECD countries. As a result, there has been growing awareness of the strategic importance of R&D across society, in the media and among some politicians.
At the time of writing, the new government has not shown any specific interest to strengthen research and innovation policies.

Citation:
https://www.crui.it/images/documenti/2016/DM_programmazione_triennale_16_18.pdf
http://www.sviluppoeconomico.gov.it/images/stories/documenti/Industria_40%20_conferenza_21_9

Norway

Score 5

Norway has increased its spending on research and development (R&D). Though innovation is limited by the fact that Norwegian industry and businesses spend less than their counterparts in other countries on research. However, government spending has increased slightly in recent years. Research policy is non-pluralistic, government-led and has historically not been strongly oriented toward enterprise or innovation. Priority research areas include energy and increasingly oceans. The country's strength lies in applied economic and social research rather than in basic and hard science research. However, there are some excellent research groups and networks in the so-called STEM subjects. Research funds are mainly public, distributed through a single research council, and recent reforms have moved in the direction of adopting a center of excellence approach.

In international comparison, the country's private sector provides little in the way of research funding. This low aggregate investment level is reflected in the relatively

low number of patents that are granted. It is also interesting to note that the share of degrees granted in science and technology is low, and that Norwegian children have fared especially poorly in scientific knowledge, at least in relative terms, in the OECD's Program for International Student Assessment (PISA) study. However, the international rankings of some of the country's most important universities have improved in recent years. The country would certainly benefit from a higher absolute level of investment in R&D. However, the research council's centralized allocation of funds and state subsidies, with only limited participation by private donors, has also been criticized as a model. The council's selection of priorities has often been too narrow. There is thus ample scope for increasing investment in academic and basic research, as well for promoting more involvement by private- and public-sector actors.

Australia

Score 4

After the Abbott government was elected in September 2013, government support for research and innovation was reduced considerably and has not materially recovered. The Abbott government cut funding to the Australian Research Council scheme, which funds non-medical university research, and abolished the Australian Renewable Energy agency, which acted to support renewable energy projects in their start-up and early stages. Also telling was the fact that under the Abbott government there was no science minister for the first time since 1931. However, with the replacement of Abbott by Malcolm Turnbull as prime minister in September 2015, a new cabinet was formed that included a science minister, and the Department of Industry and Science was expanded to become the Department of Industry, Innovation and Science. The National Innovation and Science Agenda (NISA) was announced in December 2015, emphasizing science, research and innovation as long-term drivers of economic prosperity, jobs and growth. As part of this agenda, AUD 1.1 billion was committed over four years to 24 measures aimed at encouraging entrepreneurship, fostering collaboration between industry and researchers, developing and attracting talent, and by government "leading by example." In November 2017, a report was released laying out a strategic plan to 2030 for optimizing investment in Australian innovation. The Australian government, in its May 2018 response to the report, expressed support in principle for most of the recommendations, but there is little evidence of substantive policy change since then.

Citation:
Australian Government Department of Industry, Innovation, Science, Research and Tertiary Education, 'Australian Innovation system Report 2012': http://www.innovation.gov.au/Innovation/Policy/AustralianInnovationSystemReport/AISR2012/index.html

Innovation and Science Australia 2017, Australia 2030: prosperity through innovation, Australian Government, Canberra: https://www.industry.gov.au/sites/g/files/net3906/f/May%202018/document/pdf/australia-2030-prosperity-through-innovation-full-report.pdf

OECD, Economic Survey Australia 2014, Paris: OECD, 16 December 2014.

http://www.smh.com.au/business/federal-budget/federal-budget-scientists-push-for-more-research-funding-20160411-go3uaa.html

Emma Alberici: Innovation is still the key to jobs and growth. ABC. 17 May 2018. Available at https://www.abc.net.au/news/2018-05-18/innovation-the-key-to-jobs-and-growth/9772938

Cyprus

Score 4

Research and development programs in Cyprus mainly commenced with the creation of the country's first university in 1992 and expanded with the growth of other tertiary-education institutions. Higher education records the largest R&D expenditure, while funding of private- and state-owned research centers remains low. This contrasts with the situation EU-wide, where the share of expenditure from business is higher. Notwithstanding, Cyprus ranks first in the EU in terms of per capita funds from Horizon 2020.

After many years without a coherent policy on research, the Council of Ministers announced in fall 2018 the establishment of a new scheme for the National Council for Research and Innovation. A former minister and academic was appointed as its head, but information on this new scheme and its advisory body, the Cyprus Scientific Council, remains limited.

Cyprus's capability for innovation, according to the 2018 edition of the Global Competitiveness Index, scored 44.7 points, compared to 44.6 in 2017, while in R&D it slipped from 33.9 points to 33.4. The EU notes the very low investment of both the state and private sector in R&D, placing Cyprus last in the EU28.

The country's R&D target for 2020 remains 0.5% of GDP, the lowest in the EU, offering little prospect for substantial progress.

Citation:
1. Global Competitiveness Index 2018, Cyprus, Innovation, http://reports.weforum.org/global-competitiveness-report-2018/country-economy-profiles/#economy=CYP
2. European Commission Cyprus Economy Semester Report, March 2018, https://ec.europa.eu/info/sites/info/files/2018-european-semester-country-report-cyprus-en.pdf

Greece

Score 4

Greece continues to rank below the EU average for public and private expenditure on research. In 2016 (latest available data), Greece spent 1.007% of GDP on research and innovation (OECD average: 2.337%). Given the economic crisis and that the country had spent just 0.55% of GDP in 2006, this is a notable increase. For the first time, the business sector contributed more for R&D than higher education. Notwithstanding, the main funding came from public money (42.5% of the total).

There is a measurable brain drain, depleting Greece's human resources for research and innovation. Since 2010, two-thirds of emigrants have been university graduates, while one-fourth of emigrants held post-graduate degrees or were graduates of medical and polytechnic schools.

Spending on research is mainly public. Greece lacks large corporate investors in R&D. Links between academia and the private sector are weak, reflecting institutional weaknesses and cultural resistance to public-private collaboration. There is little private demand for R&D and innovation and the corresponding supply from universities and public research institutions is small. Nevertheless, despite economic adversity, there are clear "islands" of excellence at universities in areas such as biology, IT and computer science, economics, engineering, archaeology, and history.

Nonetheless, Greek researchers, the number of which is disproportionately high compared to the levels of public and private expenditure on research, actively participate in international research consortia. For instance, the National Technical University of Athens actively participates in international projects, as does the Heraklion-based Institute for Technology and Research. Individual researchers from Greece frequently participate in international forums. Also, a very positive step was taken in 2016 with the establishment of the Hellenic Foundation for Research and Innovation (HFRI), a new public body funded by the Greek state and the European Investment Bank (EIB).

Citation:
Data on expenditure on research is drawn on Eurostat, https://ec.europa.eu/eurostat/documents/2995521/8493770/9-01122017-AP-EN.pdf/94cc03d5-693b-4c1d-b5ca-8d32703591e7
Information in English on the Greek research and innovation policy and particularly on brain drain is available from the EU, https://rio.jrc.ec.europa.eu/en/country-analysis/Greece/country-report
National Documentation Centre, Research and Development Expenditure and Personnel in Greece in 2017 – Main Indicators, http://metrics.ekt.gr/en/node/380

Hungary

Score 4

After years of neglect, research and innovation policy has become a cornerstone of the technocratic modernization project of the fourth Orbán government. The 2019 budget provides for a substantial increase in public R&D spending which, for several years, was among the lowest in the EU. At the same time, the centralization of research and innovation policy that set in under the second government dramatically increased. By intensifying the control and colonization of scientific research and higher education, the government has sought to capture one of the remaining autonomous social sectors. After the 2018 elections, the government established a National Council for Science policy, whose president and members are appointed by the government, and set up a new Innovation and Technology Ministry (ITM). The 2019 budget shifted large parts of the Hungarian Academy of Sciences' (MTA) budget to the ITM. In September, a government decree further enlarged the ITM's competences by also granting the ministry the control over the bulk of the

universities' research budgets. The ITM has announced plans to restructure the MTA's research institutes and to liquidate some of them, including the prestigious Institute of Economics. The All European Academies (ALLEA) organization has protested – in vain – against this serious constraint on research freedoms.

Citation:
ALLEA (= All European Academies) (2018): Statement on the inappropriate political infringement on academic curricula in Hungary, Berlin (https://www.allea.org/allea-publishes-statement-on-the-inappropriate-political-infringement-on-academic-curricula-in-hungary/).

Latvia

Score 4

Research and development (R&D) expenditure in Latvia was equal to 0.62% of GDP in 2015, but fell to 0.44% of GDP in 2016. Investment into R&D from foreign sources in Latvia is significantly higher than the EU average. In 2013, the EU average was 9.9%, while in Latvia it was 44% in 2014 and 45% in 2015. In 2014 and 2015, private sector investment in R&D was 0.19% and 0.12% of GDP respectively, significantly below the EU average of 1.3% in 2014.

Even though Latvia's productivity growth has been solid, innovation performance remains average at best. In the Union Innovation Scoreboard 2018, Latvia ranked 24 out of 28 EU member states in terms of innovation, up from 25 in 2017. Consequently, Latvia remained in the category of "moderate innovators." Despite the relatively high increase in venture capital, in absolute terms, investments remain small and largely dependent on EU support. Despite Latvia's previous progress from "modest" to "moderate" innovator, the share of high-tech companies in the Latvian economy is small, as is the private sector's demand for R&D activities. In budgetary debates, innovation remains a low priority.

The OECD has recognized Latvia for improving in its framework on research and development innovations, noting the consolidation of research institutions, introduction of quality-based financing models, and incentives to boost research. For example, a support program for the development of new products and technologies has been set up, managed nationwide by eight Competency Centers. The program seeks to attract at least €12.8 million in private sector investment for research and development. As of September 2018, 186 projects had been launched, which signals an appetite for similar incentives to be introduced in the future.

In Latvia, a high proportion of the population has completed tertiary education, which – paired with favorable business conditions – creates an advantageous climate for innovation-driven growth. In the coming years, the quality of public R&D has to increase, and links between academia and business need to be strengthened.

Citation:
1. Ministry of Economics (2018) Competency Centers Continue to Develop New Products and Technologies, (In Latvian) AvaibleAvailable at: https://www.mk.gov.lv/lv/aktualitates/kompetences-centri-turpina-attistit-jaunus-

produktus-un-tehnologijas, Last assesed: 28.12.2018.

2. European Comission (2018),European Innovation Scoreboard 2018, Available at: http://europa.eu/rapid/press-release_IP-18-4223_en.htm, Last assessed: 28.12.2018

3. European Commission (2018), Research and Innovation performance and Horizon 2020 Country Participation for Latvia, Available at: http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=country-profiles-detail&ctry=latvia, Last assessed: 28.12.2018

4. OECD (2017) Going for Growth-Latvia 2017. http://www.oecd.org/eco/growth/Going-for-Growth-Latvia-2017.pdf. Last assessed 28.12.2018

Slovenia

Score 4

Slovenia's R&I activities have long been of both low quality and quantity. EU funds have declined in some areas of research, as Slovenia has experienced serious administrative difficulties in absorbing funds for R&I. After years of neglect, however, the Cerar government announced substantial increases in R&I spending when introducing the budgets for 2018 and 2019 to parliament in September 2017. In 2018, the science budget increased by almost 20%. The fact that government spending still does not comprise 1% of GDP featured prominently during a major demonstration of Slovenian researchers in Ljubljana in April 2018.

Turkey

Score 4

During the review period, the government continued to strengthen the country's research and innovation capacity. The Scientific and Technological Research Council of Turkey (TUBITAK) is the leading agency for management, funding and conduct of research in Turkey.

According to the Turkish Statistical Institute, total R&D spending by the public and private sectors as a fraction of GDP in 2015 was 0.88% and in 2016 the share increased to 0.94%. During 2016, commercial enterprises accounted for the largest share of R&D expenditures, at 54.2%. While universities accounted for 36.3% of spending on R&D, public institutions' share was 9.5%. In terms of financial contributions to R&D projects, commercial enterprises have the largest share with 46.7%, followed by public institutions with 35.1%, universities with 14.4% and other sources 3.8% of R&D. In terms of full-time employment, 136,953 people worked in the R&D sector during 2016, an increase of 12% compared with the previous year. The private sector employed 53% of R&D personnel, while 38.4% worked at universities and public institutions employed 8.6% of R&D personnel.

In 2013, Turkey adopted the Tenth Development Plan, covering the period 2014 – 18, aiming to improve science, technology and innovation, as one of the building blocks for innovative production and steady growth. In Turkey, the Supreme Council for Science and Technology (SCST) is the highest-ranking science and technology

policymaking body in Turkey. In the last few SCST meetings, emphasis was placed on intensifying R&D efforts in the energy, health and biotechnology sectors.

Bulgaria

Score 3

Bulgaria ranks among the lowest in the European Union in terms of spending on R&D, and the substantial increases in R&D outlays in 2014 and 2015 have not been sustained. The share of government spending in total R&D spending is relatively high compared to the EU average, primarily due to low private sector spending in Bulgaria. Research and innovation have suffered from a strong separation of the public and the private sector, and a far-reaching institutional fragmentation. Participation in and implementation of EU-funded programs have been low. The new National Strategy for Development of Scientific Research 2017 – 2030 ("Better Science for a Better Bulgaria"), approved by parliament in June 2017, has sought to address part of these issues.

Croatia

Score 3

Croatia lacks a coherent and integrated policy framework, companies have low technological capacity to support innovation, and technology-transfer mechanisms are inadequate. Total gross domestic spending on R&D increased from 0.74% of GDP in 2010 to 0.86% in 2017. The small increase was driven almost entirely by increased R&D expenditure by the business sector, while R&D expenditure by the government and higher education sectors stagnated. However, in relation to the EU average R&D expenditure has been falling, and by 2017 Croatia was in 23rd place among the EU member states. It is the same with the number of patents registered: According to Eurostat statistics, Croatia ranks last in the EU, with only three registered patents on one million inhabitants. Overall, the EU Innovation Scorebord reveals Croatia to be only a "moderate innovator."

Mexico

Score 3

Overall, national spending on research and development (R&D) continues to be very low in comparison with other OECD countries and is inadequate for an economy the size of Mexico. Over recent years, public spending remained stable but the more important private sector spending on R&D has been very low and is the lowest of any OECD country. The private spending is dominated by large companies in a small number of sectors. A very large number of "micro" firms have little or no institutionalized access to state R&D spending, while large and efficient firms undertake their own R&D spending. There is growing awareness of this problem within Mexico itself, but it still ranks below most OECD member countries on indices relating to R&D. The OECD has stated that R&D spending in Mexico is quantitatively and qualitatively inadequate. According to official data, 1.2 million

Mexicans with university and postgraduate degrees lived abroad in 2015. It is to be expected that this number has since increased even further. Mexico has by far the lowest number of researchers per 1,000 employees of any OECD country.

In 2018, Mexico was ranked 54 out of 190 countries on the World Bank's Ease of Doing Business index, featuring low performance in components such as paying taxes, registering property, getting credit and having access to electricity. These conditions play against the attractiveness to create and fund startups in the new economy.

The 2016 election of Donald Trump and his anti-immigration policies motivated speculation about increased opportunities in Mexico for starting innovative businesses in the IT sector, offering the economic and political environment to attract startups and human capital. Though the number of venture capital institutions and other organizations have generally increased (especially in Guadalajara and Monterrey), most of the country has yet to see the potential benefits of IT investments.

Despite the poor situation of the R&D sector, the outgoing government made little efforts in improving it. The incoming president, López Obrador, has at least addressed the topic. Though Obrador only promised not to reduce public spending on R&D, which is not very encouraging.

Regarding infrastructure, the most significant development over the last year was the cessation of the construction of the Mexico City airport. In a non-binding referendum in October 2018, a majority voted against a continuation of the airport. Subsequently, the incoming president indicated that he will comply with this result, although he hasn't suggested an alternative that would solve the infrastructure challenge.

Citation:
http://www.doingbusiness.org/data/exploreeconomies/mexico
https://www.ft.com/content/7fe8f64c-4c74-11e7-a3f4-c742b9791d43
http://www.milenio.com/elecciones-mexico-2018/asi-esta-mexico-en-cuanto-a-ciencia-y-tecnologia
https://www.excelsior.com.mx/nacional/lopez-obrador-se-compromete-a-no-reducir-apoyo-a-ciencia-y-tecnologia/1260317

Romania

Score 3

Under the Dăncilă government, the progress made in recent years in the areas of research and innovation has been undone. Contrary to the 2014-2020 National Research, Development and Innovation Strategy, the government's R&I budget has been cut rather than increased. This prompted the resignation of Minister of Research and Innovation Minister Nicolae Burnete at the end of August. The allocation of research grants has been blocked by bureaucratic impediments, the central government's withholding of funds and the mass expulsion of foreign scholars from adjudicating committees.

Slovakia

Score 3

Slovakia has a weak and underdeveloped research and innovation policy. R&D intensity, the number of patent applications and levels of employment in knowledge-intensive activities are all well below the EU average and the lowest among the four Visegrád countries. Expenditure on R&D, both public and private, has gradually risen, but has done so from a very low level and remains relatively low. The increased private sector investment in R&D has not been sufficient to compensate for the state failure in managing R&D. Corporate funds account for only a quarter of the total Slovak funding, and almost 90% of all foreign resources are EU money.

During the period under review, the matter of the Slovak Academy of Sciences (SAV) has shown the government's lack of strategic vision. Ever since 2016, the transformation of the SAV from a budget-based to a more independent organization has been on the way. Originally prepared by the then-Minister of Education, Science and Research Pellegrini, this institutional shift was aimed at fostering the cooperation between the academy and the business sector. In 2018, however, the controversies over the changes between the SAV and Minister of Education Martina Lubyovár escalated due to personal animosities between the minister, who had been a member of the SAV, as well as controversies over the SAV's land ownership. Initially, the ministry designed a registration process that was criticized by the SAV as too complex and cumbersome. Eventually, the ministry initiated an amendment that effectively reversed the whole transformation process. Passed by parliament, this amendment was vetoed by President Andrej Kiska. In September 2018, however, parliament overrode the president's veto, leaving further institutional changes at the SAV in limbo.

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