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Research and Innovation Observatory Country Report 2016 Finland
The 2016 series of the RIO Country Report analyses and assesses the development and performance of the national research and innovation system of the EU-28 Member States and related policies. It aims at monitoring and evaluating the EU policy implementation as well as facilitating policy learning in the Member States.
Contents

Foreword ........................................................................................................................................ 3
Acknowledgements ......................................................................................................................... 3
1 Main R&I policy developments in 2016 ....................................................................................... 5
   1.1 Focus on National and Regional Smart Specialisation Strategies ........................................ 5
2 Economic context ......................................................................................................................... 6
   2.1 Structure of the economy ........................................................................................................ 6
   2.2 Business environment ............................................................................................................ 7
   2.3 Supply of human resources .................................................................................................. 7
3 Main R&I actors ........................................................................................................................... 7
4 R&I trends ...................................................................................................................................... 8
   4.1 Public allocation of R&D and R&D expenditure .................................................................... 9
   4.2 Private R&D expenditure ...................................................................................................... 10
   4.3 Public sector innovation and civil society engagement .......................................................... 11
5 Innovation challenges .................................................................................................................. 12
   Challenge 1: Harnessing knowledge and competence to boost innovation for societal and economic renewal ............................................. 12
     Description ............................................................................................................................... 12
     Policy response ....................................................................................................................... 12
     Assessment ............................................................................................................................... 13
   Challenge 2: A new growth mode for public and private R&I investments ............................... 13
     Description ............................................................................................................................... 13
     Policy response ....................................................................................................................... 13
     Policy Assessment .................................................................................................................. 14
   Challenge 3: Strengthening the quality and relevance of the science base and increasing internationalisation of R&I ............................................. 14
     Description ............................................................................................................................... 14
     Policy response ....................................................................................................................... 15
     Policy Assessment .................................................................................................................. 15
6 Focus on creating and stimulating markets .............................................................................. 16
References ....................................................................................................................................... 19
Abbreviations .................................................................................................................................. 21
Factsheet ......................................................................................................................................... 22
Foreword

This report offers an analysis of the R&I system in Finland for 2016, including relevant policies and funding, with a particular focus on topics of critical importance for EU policies. The report identifies the main challenges of the Finnish research and innovation system and assesses the policy responses implemented. It was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports and online publications. The quantitative data are, whenever possible, comparable across all EU Member State reports. Unless specifically referenced, all data used in this report are based on Eurostat statistics available in January 2017. The analysis does not take into account the full set of CIS 2014 data that was released mid-January 2017. The factsheet in the annex include however the most recent data including one indicator from the last wave of the Community Innovation Survey.

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HIGHLIGHTS

- The Finnish economy is still recovering from the 2008 financial crisis. In 2015, real GDP grew by 0.2%, but remained below the level prior to the crisis. In the first half of 2016, Finland’s economy grew by 0.8% compared with the same period one year before. GDP is forecasted to grow 1.1% in 2016.

- After a sharp drop in 2009, the economy showed signs of recovery in 2010 and 2011, but failed to make up for the losses in exports and investment.

- Structural factors have played an important role, including deteriorating cost competitiveness. After the crisis wages continued to increase, even when the productivity growth slowed down.

- The Finnish R&I system has a centralised governance and funding allocation system. There is a declining trend in the volume of expenditure on R&D (GERD), although it remains above 2.9% of GDP, and comparatively high.

- Business R&D expenditure (BERD) has been declining, but also public R&D expenditures were cut and allocations significantly re-designed.

MAIN R&I POLICY CHALLENGES

- **Harnessing knowledge and competence to boost innovation for societal and economic renewal**: aligning R&I priorities and investments with measures should aim to boost productivity. Coordinated and effective R&I policies are needed to better harness innovation. Recent policy reforms and plans signal a commitment to innovation; Innovative measures have been adopted in 2016, but their impact in the light of significant funding cuts is not clear;

- **A new growth mode for public and private R&I investments**: the declining trend in investment in R&I could have immediate and long-term impacts on outputs and the economy. Central government and business R&D outputs have declined since 2010.

- **Strengthening the quality and relevance of the science base and increasing internationalisation of R&I**: measures aim to improve the quality and focus of research efforts. There is steady progress in internationalisation but there is scope to measure the relevance of research, and develop better incentives.

MAIN R&I POLICY DEVELOPMENTS IN 2016

- The Government set out a detailed [operative programme](#) for its Government Programme; It also announced [state budget](#) reductions in public R&D funding, including industry relevant public R&D funding;

- **Demand and user driven approaches and measures developed**, including Growth Agreements and public procurement measures;

- Revisions made to the Research and Innovation Council (RIC) decree and [members](#);

- New legislation and strategies, including the Public Procurement Act 2016, Crowdfunding law and Reboot Finland 2016;

- New [Regional social and health reforms](#) and re-organisation of services – impacting R&I administration and market development.
# Main R&I policy developments in 2016

| Detailed **operative programme** (01/2016) | In 2016, further decisions of the Government Programme and it’s 26 Key Projects were set out in an action plan. It includes a one-off appropriation of €1bn for Key Projects – many focusing on R&I. Thematic priorities include cleantech, digitalization, bioeconomy, and health sector. The Government budget saw a reduction in public R&D funding by €157m from the previous year, including industry relevant public R&D funding; |
| Demand and user driven approaches and measures developed (2016) | Innovative public procurement measures were further developed (target of 5% of public procurement), piloting €100m experiment fund will be explored, Growth agreements with major cities, deregulation (not especially R&I focus), Smart and Clean Fund, regional centres of excellence and ecosystems, TekesHack - Design Contest for better partnerships; |
| RIC decree and members (09/2016) | Amendment to the decree of the R&I Council (RIC) in 2016 and new members nominated. The first meeting took place in September; the new role and significance of RIC not yet clear; |
| New legislation (2016) | New legislation and plans: **Public Procurement Act 2016; New Crowdfunding law 2016; National Digitalisation Strategy: Reboot Finland 2016; Health Sector Growth Strategy for Research and Innovation Activities with a roadmap 2016-2018; National Cancer Centre and Genome centre was established 2016; Revised policy with regard to immigration (focus on refugees, not on immigration broadly);** |
| Regional social and health reforms (08/2016) | A Regional Administration Reform and re-organisation of social welfare and healthcare services: reform plan 2016, new law taking force in 2017 and fully implemented 2019 – with significant impact in R&I administration, as well as for market development (outsourcing/service procurement). |

## 1.1 Focus on National and Regional Smart Specialisation Strategies

**Description and timing:** Finland aims for every region to formulate a Research and Innovation Strategy for Smart Specialisation (RIS3), which are set and overseen by the Regional Councils. The principles of Smart Specialisation have traditionally been applied in Finland both on national and regional levels with a focus on the knowledge base, lead markets initiatives and ecosystems development. A broader goal is to increase specialisation of universities and PROs through increasingly strategic R&I choices.

**New developments:** **Universities Finland** (UNIFI) is negotiating to agree priorities and focus areas among universities and the Ministry of Education and Culture (MEC) and the Academy of Finland (€50m) support the process - by funding incentives. In the Capital Region (Uusimaa), RIS3 strategy is implemented in the form of five main priorities and related priority portfolios, and their activities are organised on shared, thematic innovation platforms. The platforms enable to coordinate the progress and change processes as well as to promote active collaboration between and within the key actors and their stakeholders. It is also typical that the smart specialisation strategies are tightly coupled with other regional plans, regional strategic programmes and other
plans of the provinces. Innovation is a common topic to all regions in Finland and the RIS3 objectives are not difficult to align with other regional objectives. The current period of EU Structural Funds (SF) 2014-2020 includes a range of innovative actions through smart specialisation. The activities included in the strategies and funded under the SF, are typically complemented with other nationally and regionally funded innovation activities. Amongst the national level activities targeted towards the regions are the Innovative Cities (INKA) Programme and the government Growth Agreements signed in 2016 (10 agreements) with the major cities, although current plans include a number of INKA activities. The Government has decided that the INKA-Programme will end during 2017. Cooperation between universities, universities of applied sciences and research institutes is aimed to build stronger but fewer regional knowledge hubs to boost European SF interventions in RDI. In June 2016 the Government decided to allocate an additional €9m to regional innovations and experiments (AIKO) for the current year. In total it allocated €30m to the AIKO activities for 2016-2018, under the Government Key Projects. These activities include the growth agreements with major cities, as well as Anticipated Structural Reforms (ERM) of regions. The ERM covers a number of experiments and activities to enhance regional economic resilience and adaptation.

Outstanding issues: A process is ongoing to further strengthen specialisation, and implementation, with the latter aiming to combine both top-down and bottom-up approaches in order to avoid the risks involved in making poor top-down policy choices.

2 Economic context

Finland's real GDP grew by 0.2% in 2015. In the first half of 2016, Finland’s economy grew by 0.8% compared with the same period one year before. Booming construction investment is leading the recovery. Economic activity is forecast to increase modestly this year and next. In 2018, however, growth is expected to pick up as improved cost-competitiveness boosts exports (EC, 2016a). After four years of recession, an economic transformation aims to address cost competitiveness, an aging population and a decline in trade with major export markets, including Russia. The performance of the Finnish economy is lagging significantly behind most countries in the euro area. Government policies are focused on balancing public finances and reforms to address structural weaknesses. Sustainable growth and investments in key sectors is also needed. Labour productivity in Finland has fallen since 2007, especially in the manufacturing sector. High-productivity sectors suffered most during the downturn and production structure shifted towards less productive sectors. After the 2008 global crisis the wages continued to progress steadily although productivity growth slowed (OECD, 2016). Preliminary national accounts data shows the growth rate of labour productivity in the national economy was 0.4% in 2014. In 2013, labour productivity did not grow and in 2012 it contracted by 2.1%. The respective growth rate of total productivity in the national economy was -0.1% in 2014, (-0.7% 2013; -2.5% 2012) (Statistics Finland).

2.1 Structure of the economy

 Manufacturing is, by a clear margin, the biggest single contributor to Gross Value Added (GVA) in Finland accounting for 17% in 2015, which is very close to the EU average 15.53% (2015). However, its share significantly decreased in recent years, down from 23.3% in 2007. Part of this decline is due to the contraction of the manufacture of computer, electronic and optical products sector where the value-added declined from over €8 billion in 2007 to less than €800 million in 2012. The largest R&D performer in Finland - computer manufacturing, electronic and optical products - not only dramatically decreased in R&D intensity but also lost 90% of its Added Value in the period 2007-2012. The increasing share in the export-market of competing products in this sector (e.g. smart phones) from emerging players, along with the weakening cost competitiveness, e.g. high cost of labour helps explain the trends during this period. Employment in this sector follows a similar trend with losses of about 35% between 2008 and 2013.
added by industries as a proportion of GVA (at basic prices) in 2015 (2012) were: Primary production (agriculture, forestry, fishing 2.5% (2.7%); Secondary production (manufacturing, construction) 26.8% (27.0%); Private services 50.3% (49.6%); Public services 20.3% (20.6%) (Statistics Finland, 2016a).

2.2 Business environment
The 2017 Doing Business report ranks Finland 13th in 2016. Although it drops three places on 2015 (10th), and stood at 8th in 2014, it is still the fifth highest of other EU Countries (World Bank, 2016). Finland also performs well on the WEF Global Competitiveness Index, although it has slipped in the overall rankings at 10th in 2016 (8th in 2015). It is among the top 5 performers in institutions, and health and primary education (1st), innovation (3rd), higher education and training (2nd). It scores lowest in market size (59th) macroeconomic environment (46th), labour market efficiency (23rd) and – perhaps surprisingly - infrastructure (26th) (WEF, 2016).

2.3 Supply of human resources
New graduates in science, maths, computing, engineering, manufacturing, construction is higher than EU average (2.74 per 1000 population vs 2.3 for EU-28, 2014). However, it is below EU on its average share of female researchers (32.1% vs 33.17%, 2013). Finland is above the EU average on new doctorate graduates (1.28 per thousand population vs 1.07, 2013) and number of researchers (10.18 per thousand population in 2013 vs 5.3). Following the downturn and reforms in Finland, young people and highly skilled workers are most affected by unemployment (total at 6.2%, 2016). However, a higher level of education still correlates positively with lower unemployment rates. Finland has the second highest proportion of women on scientific boards and share of female university rectors. It also received the highest influx of refugees per capita in Europe and steps to match to labour needs and tap skilled STEM migrants are in place, involving Tekes.

3 Main R&I actors
The R&I governance system is centralised in terms of national guidelines, strategies and funding, but a mix of national and local administration gives regions a relatively high degree of autonomy in the design and implementation of regional policies. Regional autonomy will be further strengthened, as a result of the planned administrative reform.

The R&I system is divided into four strategic and operational levels. Innovation policies and strategies are led by the Finnish government, which decides on national development goals and sets the general guidelines. Funding agencies, universities and research institutes have substantial freedom of creating and implementing their strategies. R&I policy has been increasingly connected with societal issues (e.g. globalisation, ageing, the environment and public health) that pose a challenge to growth and well-being. Such challenges can be tackled with public incentives for private innovation, public sector innovation (or public procurement), growth entrepreneurship, service innovation as well as user and demand-driven innovation. This policy framework also aims to support collaboration and engagement between the public and private sectors on these issues.
Figure 1. Finland’s R&I system

- **RIC**, Research and Innovation Policy Council
- **MEC**, Ministry of Education and Culture
- **MEAE**, Ministry of Employment and the Economy
- **SA**, Academy of Finland
- **Tekes**, Finnish funding agency for innovation
- **Sitra**, the Finnish Innovation Fund
- **Finnvera** Ltd, a specialised financing company owned by the State of Finland and it is the official Export Credit Agency (ECA) of Finland.
- **TESI**, FII, Finnish Industry Investment Ltd, a government-owned investment company
- **ELY Centres**, Centres for Economic Development, Transport and the Environment are responsible for the regional implementation and development tasks of the central government.
- **Finpro** helps Finnish SMEs go international, encourages foreign direct investment in Finland and promotes tourism
- **VTT**, Technical Research Centre of Finland
- **HEI**, Higher Education Institutions (Universities, Universities of applied sciences)
- **PRO**, Public Research Organisations (Research.fi, PROs)

### 4 R&I trends

Finland’s gross domestic expenditure on R&D (GERD) fell to 2.9% in 2015, having rapidly in the late 1990s, especially due to significant R&D investments by Nokia. Relative to GDP, GERD peaked in 2009, at 3.8%. Despite the decline, the level remains among the highest in the EU and globally among advanced economies. There are four main sources of R&D funding: the business sector (€3,325m), the public sector (€1,754m), foreign sources (€882m) and non-profit (€93m) (see Figure 2). The decline in business sector funding since 2008 is clear.
4.1 Public allocation of R&D and R&D expenditure

Public R&D funding (GBAORD as % of GDP) decreased since 2010 from 1.1% to 0.96% in 2015. The share is estimated to fall to 0.87% in 2016, but will remain above the EU average (0.67% in 2014). It is mainly allocated to two ministries: the Ministry of Education and Culture (MEC) and the Ministry of Economic Affairs and Employment (MEAE), and to their agencies. In 2016, the share of MEC is 60% while that of MEAE was 27%. The rest (13%) is allocated to several ministries. The share of MEC has increased during recent years mainly due to additional funding to the Academy of Finland, and cuts in funding of VTT, other PROs, and University hospitals and especially of Tekes. The priority in research has shifted towards scientific research (Statistics Finland, 2016) (Public R&D funding for private sector is on a low level (0.07% of GDP; EU average 0.09%, 2014) and is further declining due to the cuts decided by the Government. Finland doesn’t use tax incentives, and the overall incentives for private R&D are very low compared to OECD countries. According to WIPO, public incentives for private R&D (direct funding and tax reductions) in different countries generally accounts for 10 – 20% of BERD, but about 3% in Finland (Global Innovation Index, 2015). Public funding for Business Enterprise Sector (BES) has shifted towards refundable instruments, nearer to markets. Therefore, funding for any knowledge creation and competence building required by businesses is weak compared to leading OECD countries.

The major R&D funding agencies, Academy of Finland and Tekes - the Funding Agency for Innovation, are responsible for most of the competitive funding: in 2016 the Academy 23.8% (3.9% increase from 2015) and Tekes 20.7% (23.2% decrease from 2015) of public R&D funding (Statistics Finland, 2016). The Academy provides funding for scientific research and researcher training, and aims at improving research capacities. Since 2014, The Academy runs the Council for Strategic Research (€55m) which includes societal impact criteria besides scientific quality. Tekes funds for applied research in universities, research institutes and large companies, provides competitive grants and loans for development and innovation in SME’s, grants and loans for YIC’s (Young Innovative Companies) and start-ups, and VC-investments as a fund of funds.

Public research is conducted by universities (14 in total), public research organisations (12) and universities of applied sciences (23+2). Public research organisations (PRO) perform about 9% of all R&D activities. GERD as a % of GDP performed by PROs was 0.24% in 2015. The share of funding (for research) from outside sources was 53% in PRO’s in 2015. The reform of central government research institutes and research funding has increased the share of competitive funding for PROs. HEI’s renewed funding model will emphasize scientific quality but incentives for cooperation and societal and economic impacts remain quite weak. Higher education institutions...
HEI perform around 24% of all R&D activities. In 2015, universities’ share of the HEI R&D expenditures was 86%, universities of applied sciences’ share 9% and university hospitals’ share 4%. GERD as a % of GDP performed by HEIs was 0.71% in 2015 (Statistics Finland, 2016).

4.2 Private R&D expenditure

Business expenditure on R&D (BERD) stood at 1.94% of GDP in 2015, showing the strong role of the private sector in the Finnish R&I system (EU average 1.3%). The share of GERD performed by the (BES) was 67%, and 63% was funded by the BES (including from abroad) in 2015, despite the recent decrease of the share (Statistics Finland, 2016b). These shares are quite common among leading EU countries, but BERD and R&D funded by BES as % of GDP are much higher in Finland at 1.59% (excluding from abroad, 2015) compared to the EU average 1.13%, 2014.

However, private R&D intensity in Finland saw a general decrease since 2009, although it still is at a high level in comparison to other leading EU countries. Finland reported on a decline in the business sector’s share of R&D expenditure from 74% to 67% in 2008 to 2015 (Statistics Finland, 2015). The decline is related to the severe drop in R&D expenditure in manufacturing and especially ICT sector (see Figure 4). ICT is the leading sector in terms of R&D expenditure (although not in terms of turnover or export) in Finland. It was dominant in R&D in 2008 (about 58% of BERD), and still in 2015 was large (40% of BERD – Statistics Finland). This is mostly due to the restructuring of Nokia. Nokia’s share of BERD peaked in 2009 (slightly above 50%), and has declined to less than 20% in 2014 (estimated by ETLA, 2016). A small part of this decline in BERD was compensated for by an increase of R&D expenditure in services and other manufacturing. Manufacturing and services accounted for more than 71% of the BERD in 2015. In fact, BERD in manufacture went from 2.07% of GDP in 2010 to 1.3% in 2015 whereas BERD in the service sector increased from 0.46% to 0.52% of GDP during the same period (Statistics Finland). Equally, the share of services is high (up to 50% in many manufacturers) among manufacturing companies at present, and therefore a much greater share of BERD is focused on services than the statistics might imply.

When segmenting private R&D expenditures based on company size, 73% of R&D was executed by large companies, 22% by other small or medium enterprises (SMEs), and 5% by micro companies in 2015. Thus, Finland’s R&D is dominated by large companies. The moderate role of the SMEs and especially of “mid-caps” is a challenge for Finland. Foreign affiliates in Finland covered only about 15% of the business sector R&D expenditures in 2015 due to their low share of the turnover of all
companies (23% in 2014). Related to innovation in general, 55% of companies (with more than 10 employees) reported innovation activity in 2012-2014 (Statistics Finland, 2014a), which is above the EU average.

Although Finland ranks very high in the intensity and frequency of business-academia cooperation, the volume of BES funded research performed by HEI and PRO is low, and most (56%) of the BES’ R&D investments are focused on improvement of existing products and services (global best performers’ 26%) (Synergy, 2013). 84% of the BES R&D expenses are directed to development, 13% to applied research and 3% to basic research (Statistics Finland). Therefore, BES R&D investments are not reaching for radical new to global markets innovations which may indicate weak incentives – both demand driven and funding incentives.

Figure 4 Top sectors in manufacturing (C26=manufacture of computer, electronic and optical products; C27= manufacture of electrical equipment; C28=manufacture of machinery and equipment n.e.c) and top service sectors: J=information and communication, M=professional, scientific and technical activities, G=wholesale and retail trade; repair of motor vehicles and motorcycles

4.3 Public sector innovation and civil society engagement

This section covers some of the key topics of this broad area of public sector innovation:

Digital public services in Finland rank 4th in the EU (Scoring 0.67; EU average 0.51), however, it is slow to improve on this good performance (EC, 2016b). Finland ranked overall 10th in the UN Survey of eGovernments in 2014, placed 4th among EU countries (after France, Netherlands and the UK) and is therefore among the eGovernment world leaders. The current Government pays particular attention on the modernisation of public sector structures and services. The objectives have been included as a specific section (i.e. Objective 5: Digitalisation, Experimentation and Deregulation) in the Government Programme. The Government modernisation agenda is implemented through the following five key projects:

- Public services digitalised
- Digital business growth environment
- Legal provisions improved
- Culture of experimentation
- Management and implementation

The key projects have been elaborated into specific work plans and assigned resources. Their implementation is led by one or more designated ministers assigned to each project (PM Office, 2016). For example, Reboot Finland is a new joint activity by Ministry of Economic Affairs and Employment, Tekes, and Finpro to challenge companies, cities and public organisations to restart
their services with digital services. It's 100 concrete actions aim to redefine public services with the help of clients, citizens, companies and public service providers. In addition, The Government will undertake studies of policies on the bioeconomy and clean solutions for use by government and ministries (PM office, 2015).

Citizen science initiatives include:

**Open Science and Research**: a broad-based cooperation initiative (2014-2017) between ministries, universities, research institutions and research funders such as the Academy of Finland and TEKES - the Finnish Funding Agency for Innovation, Finnish Social Data Archive (FSD), National Library of Finland, Federation of Finnish Learned Societies, FinnoA-the Finnish Open Access Working Group, CSC - IT Center for Science Ltd. As an example of higher education institutions, the University of Helsinki plays a key role in Open Access in Finland.

**Open Knowledge Finland (OKFFI)**: a not-for-profit association and part of the wider international Open Knowledge network to promote opening and usage of open knowledge and advance development of open society in Finland. The association was founded in 2012 and has more than 200 members who present widely the Finnish ‘open’ scene including individuals, companies and other organizations.

**Open Citizen Science**: a project commissioned from the Open Knowledge Finland by the Finnish Ministry of Education and Culture's Open Science & Research initiative. The project began work in August 2016. The project brings together open science and citizen science.

5 Innovation challenges

**Challenge 1: Harnessing knowledge and competence to boost innovation for societal and economic renewal**

**Description**

Important economic and societal challenges in Finland require coordinated R&I policies that better harness innovation. Productivity growth has stopped, and Finnish exports have declined by approximately one fifth since 2008. Finland lost much of its cost competitiveness in global markets for reasons related to the high labour cost level and deterioration in multifactor and labour productivity (Maliranta, 2014). The impact of Finnish R&I policy measures will be low unless cost competitiveness supports the growth and exports of Finnish companies. Supporting sustainable growth and employment also requires a focus on innovation. These challenges call for renewal of existing businesses and creative destruction in the economy.

**Policy response**

National innovation policies aim at diversifying the structure of business and industry, improving the level of research activity and reforming public sector research structures and operations aiming at sustainable growth and employment (Finnish National Reform Programme, 2016). The Government Programme 2015-2019 includes R&D policy objectives on university-business collaboration to utilise and commercialise research results. It also plans to support new skills based business activity by building growth environments as well as innovation and development platforms for digital business and providing open data resources. Funding increase for business capital markets is also announced (NRP, 2016). Investments in new growth sectors are planned, including in the bioeconomy, clean and green technologies, healthcare, and digitalisation, which cuts across these areas. There will be measures to boost experimentation, as well as deregulation. Public services will be digitalised. Tekes is running programmes related to digitalisation (5G, IoT, Smart City), and several new programmes are under preparation. The digitalisation strategy of Tekes was widened to a national strategy Reboot Finland together with the MEAE and Finpro. It will be further widened in cooperation with the Federation of Finnish Enterprises and Chambers of
Preparing of the overall healthcare reform is due by the end of 2016. In terms of R&I support and coordination across Government, the decree of the Research and Innovation Council was changed in April 2016. Its tasks became more strategic and pre-emptive. The new RIC has been nominated and was convened in September 2016, with a new, reduced Ministerial composition and tasks yet to be precisely defined.

**Assessment**

The Government’s recent policy plans and reforms signal a commitment to R&I and the objectives of specific plans are very relevant from the R&I policy perspective. The initiatives related to innovative procurement, piloting, experimentation, internationalisation and growth companies are much welcomed. Policy programmes for new growth areas, such as clean technology, biotechnology and digitalisation are promising, although of relatively small-scale. The Government Key Projects introduce a genuinely new approach to R&I policy-making in Finland - precisely focused and resourced initiatives with specific targets and deadlines. However, a less welcome policy-change has been the budget cuts in R&D funding that focused on the support to business R&D, and especially to incentives for BES – HEI – PRO cooperation. A study has shown the effectiveness of the support (MEAE, 2014), with roughly half of cooperation based on those incentives (Tekes Project database, and Statistics Finland, 2015). The impact of the Academy of Finland’s Key Project funding aiming at strengthening the quality and impact of research will remain marginal compared to these cuts. One of the current Government’s objectives is to further strengthen business – university cooperation, but with incentives for cooperation mostly phased out, it will be difficult to find other effective measures to support this. The introduced cuts are steering the focus of public research funding towards curiosity driven-research. At the same time, the incentives shift company research projects nearer to market, which increases the imbalance of the allocation of R&I investments in Finland. The lack of strategic applied research, and the lack of radical innovations indicate an imbalance in current resource allocation. The move of the major R&I actors (Finpro, Finnvera, Tekes, TESI) to the same premises (Team Finland house) as well as the renewed Team Finland strategy could further intensify service providers’ cooperation. Healthcare reform will have a significant impact on regional governance and on the governance, provision and demand in the healthcare market in Finland, as well as on the role of small service providers and innovation.

**Challenge 2: A new growth mode for public and private R&I investments**

**Description**

Central government and business R&D investments have declined since 2010, completely changing the R&I landscape in Finland. While still recording a relatively high R&D intensity, the share of business-relevant research is low, and continued to decline in 2016. The impact of the budget cuts will further increase over the short-medium term. For a long period, Finland has had a strong mutual commitment by stakeholders to a joint vision of a knowledge-based society with investments at the forefront of innovation. Such a clear commitment is not evident anymore. R&D investments outside of the leading companies are merely average, and below average for SMEs.

**Policy response**

The Government’s proposed budget allocations for 2016 show a continuation of R&I budget cuts representing an overall 9.4% cut in the R&D budget from 2015. Public funding for business-relevant R&D continued to be cut in 2015 (Tekes funding -€25.1m, -6.6%) although total public funding for R&D increased by €46.9m, 0.6%. The reductions in Government R&D budget allocations for 2015–2016 were in total of €157m (Tekes -€107m, -23.2%). At the same time, the Government programme includes a number of Key Projects focusing on innovative procurement, piloting, experimentation, internationalisation, growth companies and near to markets incentives.
The Key Projects to reform competencies and education mainly focus on education. Other changes in budget allocations for research emphasise curiosity driven research. Earlier introduced measures to these ends include the 2008 Tekes funding concept for young, innovative enterprises, and new VC - start-up ecosystem; the enlargement of Finnvera’s mandate; the expansion of the Vigo Accelerator Programme, which anyhow were changed to a totally independent private actor according to the original plan; an ICT 2015 working group’s (2012) strategy to mitigate the effects of the sudden structural change; the new strategy of Tekes with emphasis on growth companies; establishment of Tekes Venture Capital Ltd fund of funds with the possibility of asymmetric distribution of profits; and the governmental decision on central government spending limits for 2014–2017 in April 2013. Moreover, the Government Programme aims to create new market opportunities and market driven incentives for SMEs and produce ground-breaking innovative solutions to serve the needs of the Finnish public sector.

**Policy Assessment**

The Government’s initiatives related to innovative procurement, piloting, experimentation, internationalisation and growth companies may be strong incentives for business RDI. However, the impact of the Key Projects’ funding for R&D is likely to remain limited, and their impact on the knowledge-base creation relevant for businesses should be assessed. The Finnish R&I system has been characterized by a combination of top-down coordination and bottom-up consensus building, which have integrated public strategic choices and priorities in the businesses’ views, market information and opportunities, and by a strong trust on the positive impacts of investments in education and R&I. There are signals that this culture is changing. In many respects, the focus of recent cuts in public R&D funding are not aligned with the objectives of the Government Programme. For example, the shift from direct grants to loans is not likely to increase R&D investments of businesses. The new role of the Research and Innovation Council might lead to a wide consensus and commitment on a new national RDI strategy.

**Challenge 3: Strengthening the quality and relevance of the science base and increasing internationalisation of R&I**

**Description**

With regard to the quality and internationalisation of research, the performance of the Finnish innovation system is merely among the EU average level. Hence, strengthening of leading-edge research and internationalisation of R&I are needed. While overall the inputs to the science base remain strong, the scientific performance of Finnish research, measured by bibliometrics, including citation indicators, has remained flat since 2000. Despite high R&D investments and shares of new doctoral graduates, it is not matched with high quality scientific output. One explanation is that specialisations in key or strategic fields have not been sufficiently pursued, resulting in low numbers of researchers at the top of their field. Most Finnish universities reach mid-level in the international university rankings and Finland is losing its rank in top publications or excellence rankings (14% of publications in top 10% highly cited, compared with Sweden 15%, and 70 on the Research Excellence Indicator, against Sweden’s 88 score). Furthermore, the internationalisation of STI is relatively weak, affecting both public and private sectors, with low international mobility of research (in particular the mobility of researchers and the utilisation of international funding opportunities). Finland shows moderate levels of international funding for R&D (14% of GERD in 2015) although it has been growing with 84% increase in 2010–2015, (Statistics Finland, 2016). However, most of the increase came from private funding from abroad, and was due to the rise of the role of the affiliates of multinationals. The share of foreign doctoral students is also low (e.g. 7% of doctoral graduates have a citizenship of another EU member state, and 7% of a non-EU, compared with 11% and 22% respectively in Sweden, Deloitte, 2014). In five years (2007–2012) the share of foreign students in universities increased by 75% from 3.3% to 5.8%, but altogether the level remains very low. In 2012 the share of new foreign student was 12% and the share of
foreigners among doctorate graduates 18%, (FNBE, 2016). In 2010–2013 foreigners’ share of all recruited professors was 14%, (Academy of Finland, 2014). Co-publishing with foreign researchers has increased slowly but continuously, being 52.7% of total in 2012 (rank 12th among OECD). Moreover, while levels of international co-publications are increasing, international co-patenting is below the levels of its peers.

**Policy response**

The current government is addressing the quality of research through the reform of the research system and by setting budget incentives of universities. The government budget cuts are aimed at encouraging stronger specialisation and strategic choices at universities and research institutions. The relevance of the scientific research for innovation and the economy of the country is not measured, although there is a strong evaluation culture.

There are a number of measures, which are aimed at increasing the quality of the science base through structural changes, improving financial incentives and reforming the financing models. These include the new University funding model (2013, 2015 and a proposal 2017), the structural development scheme for universities of applied sciences implemented in 2014, the reform of research institutes and research funding (starting 2014) including the establishment of the Strategic Research Council (SRC) in 2014, the R&I recommendations for 2015-2020 by the Research and Innovation Council, the Finnish Research Infrastructure Committee, and updated Finland’s national roadmap for infrastructures 2013. Furthermore, in 2009, the Academy of Finland found that the country has too many centres of excellence for a country of its size, and recommended mergers to form larger centres to end funding being spread too thinly.

The Government Programme outlines the Finnish education and culture policy and specifies the main objectives and tasks for this. According to the Programme, Finland will be further developed as one of the world leaders in education, knowledge and modern learning. The objective is to raise the level of competence and education. Six of the Government's Key Projects focus on promoting these objectives, with a total funding of €300m in 2016–2018. Most of this will be focused on education, some on working life and culture. One of the Key Projects is focused on cooperation between higher education institutions and business life allocating €30m to the Academy of Finland (MEC: Knowledge and Education).

The Academy’s key project funding is aimed at strengthening the quality and impact of research and at promoting active collaboration with end-users and beneficiaries of research results. The Academy has teamed up with Tekes, to contribute to the implementation of the key project. Tekes has launched its own funding programmes in support of the key project. (Academy of Finland: Key project funding).

Finland is committed to addressing the weak internationalisation of its science base. The Team Finland network's strategy was renewed in 2015. It promotes Finnish companies access to markets abroad. It brings together all state-funded actors and the services they offer to promote internationalisation and attract foreign investments to Finland. To support EU programme participation and broader internationalisation, the University funding model reforms sought to increase incentives for internationalisation. For example, the Finland Distinguished Professor Programme (FiDiPro) scheme continue to attract high level foreign talent to Finland. Finland slightly increased its applications to H2020 compared with FP7, though saw a slight decline in signed grants. The Universities themselves have been active in boosting internationalisation.

**Policy Assessment**

The real impact of the excellence-driven funding models and advances in structural reforms of funding agencies, research institutes and universities can only be assessed in the longer term, but in the medium-term Finnish science quality has been stable while leading countries have been able to raise it. Some mergers have also taken place. To date, the means for coordinating and
strengthening universities’ strategic choices have been soft and results have been achieved quite slowly. To accelerate the process of making strategic choices, the government has reallocated €50m from universities’ institutional funding to competitive funding (Academy of Finland) for this purpose, and decided further cuts to university funding. These measures may boost the process. While only bibliometric indicators have been used by the 2014 review of the state of scientific research in Finland to measure quality, the relevance of the research has not been measured, one should be cautious in drawing conclusions. As an example, Finland’s performance is poor in ICT related sciences, but in ICT related patenting Finland is on top globally. This indicates the need for broadening the scope of indicators in assessments as well as in funding models of universities. Related to this, regional policies may also affect its ability to reach scientific excellence as several universities established in remote locations with low local demand combine with a lack of specialisation that might otherwise attract top talents or support comparative advantages.

Relevance of research is also important if societal and economic impacts are sought. The policy of the Government (related to the funding cuts) redirects the priority in research funding allocation towards curiosity driven, open research, and the priority in innovation funding towards incentives nearer to markets. Therefore the knowledge-base development for the needs of enterprises, including applied research, appears to be insufficiently funded, and enterprises’ role in choosing research topics and guiding the research in cooperation initiatives is weakening. Funds allocated to the Key Projects are marginal compared to the cuts in the same areas. The Team Finland approach has become an essential element of the implementation of Finnish STI policy. Furthermore, progress on increasing the internationalisation of research in Finland has been modest. The slow progress may reflect the lack of internationalisation of the economy and society as a whole, including immigration policies. Finland should continue to foster participation in EU programmes to support its internationalisation aims. Related to the Finnish societal and economic challenges, stronger incentives would be needed for multidisciplinary, challenge and problem oriented research, and international and national cooperation.

6 Focus on creating and stimulating markets

This section describes and assesses national level efforts to introduce demand-side innovation policies to stimulate the uptake of innovation or act on their diffusion, including public procurement and regulations supporting innovation. It also analyses policy measures aimed at internationalisation of companies with the aim of increasing the innovativeness of the economy.

On the political level, Finnish innovation and research policy is increasingly connected with societal issues (for example, globalization, ageing, the environment and public health) that pose a challenge to growth and well-being. The challenges are increasingly tackled with public sector innovation, public procurement, growth entrepreneurship, service innovation as well as user and demand driven innovation. This policy framework also aims to support collaboration and engagement between the public and private sectors.

A number of demand and user driven policies and measures are being developed. A broad-based group of pioneers – public sector actors, academics and private enterprises – began to develop the themes resulting in the Demand and User Driven Innovation Policy Action Plan 2010–2013, building on existing initiatives. Within these approaches the Government aimed to develop competence and incentives for demand and/or user driven RDI activity as well as promote the cooperation between public and private actors, increase citizens’ participation opportunities and develop co-operating models and platforms. The RIC Policy Guidelines in 2014 referred to public procurement as a key tool of demand driven innovation policy.

A reform of Finnish public procurement legislation to simplify procedures, make the bidding procedure easier for SMEs, review the national thresholds, and create a supervision mechanism for public contracts began in 2013 by the MEAE. The working group, appointed for the preparation, published its report in 2015; a new Government proposal is in a Parliamentary reading in 2016.
and the new legislation should come into force by the end of 2016. The existing legislation does not prevent innovative procurement but the opportunities would be better defined by the new Public Procurement Act; it includes two new procedures: innovation partnership and digital catalogues.

Further, according to the Government Programme, and as a part of the project "Regional Innovations and Experimentations (AIKO)”, the Government will ensure competitiveness, and promote growth, and use resources and expertise available in different parts of the country. Launching regional innovations and experimentations (AIKO) involves three tools: 1) measures for anticipated structural change (ERM), 2) growth agreements between the state and selected cities, and 3) establishing nationally important growth zones. A total of €30m will be available for the measures in 2016 – 2018 which period the agreements will cover (MEAE, 2016). They provide financial support for regional and industry-specific centres of excellence, and according to the Government Key project, major investments in the future by cities and municipalities (including joint municipal authorities) will be used as a testing ground for new innovations and model projects to promote exports. To support these efforts, a unit for innovative public procurement will be established and Tekes’ Smart Procurement programme utilized. Cooperation between cities and municipalities will be expanded to create a larger lead market and disseminate best practices. They can be concluded with cities, growth zones and theme-specific urban networks. The MEAE is responsible for the preparation of the agreements for central government. The first agreements were signed with seven cities (Joensuu, Lappeenranta-Imatra, Oulu, Tampere, Turku and Vaasa), and with two growth zones. In May 2016 agreements were signed with the cities of the capital district and city of Lahti. All of the signed agreements include cities’ commitment to innovative procurement. The investments in the future made by urban regions will serve as development platforms generating demand for innovative solutions.

AIKO actions are coordinated with the ending INKA Innovative Cities Programme. For INKA-Programme (2014-2017) MEAE has selected 12 urban regions and five themes in which to create and strengthen internationally attractive innovation hubs. Selected themes are bioeconomy, sustainable energy solutions, cybersecurity, future health, smart cities and renewable industry.

The objectives of the Government programme are even more ambitious. One of the Strategic objectives includes a Key project “A culture of experimentation will be introduced” which will aim at innovative solutions, improvements in services, the promotion of individual initiatives and entrepreneurship, and the strengthening of regional and local decision making and cooperation. One of the Government’s targets is that 5% of all public procurement will be innovative. The public sector and municipalities especially have a significant role in the development and renewal of markets (e.g. health, social services, environment, construction, and transport) and municipalities represent 2/3 of procurement volume. In 2012 the total value of public procurement in Finland was €33b, equal to approx. 17.20% of GDP (EC 2014). The value is estimated to be €35b in 2015. Many municipalities have already begun to use public procurement as a strategic tool of renewal, which supports them in their long-term development needs. Some municipalities have begun piloting design expertise in order to make the provision of public services more user driven. A report of the MEAE from 2015 presents a full list of demand driven innovations with examples of executed pilots, demonstrations and references. They include innovations related to PCP (Pre-commercial procurement), PPI (Public procurement for innovation), agile implementation, standardisation, service design, user’s/citizen’s involvement, open public data, demo and pilot environments (MEAE, 2015). Examples of platforms for open innovation, agile piloting and innovative procurement are Innovillage – an Open Innovation Community, Forum Virium Helsinki, Smart Kalasatama - Agile piloting.

Company innovation behaviour has changed in recent years with more customers involved and integrated in innovation processes, and demand driven innovation has a high priority also on the political and ministerial level. The Government programme and its Key Projects are strongly committed to boost demand driven innovation. Until 2016 the activities and impacts of the policy
were mainly related to public procurement pilots funded by Tekes, while demand driven innovation has not yet become part of the mainstream in innovation policy. Survey data has revealed that innovation activity was not required as often in the procurement contracts, but relatively more enterprises had been involved in innovation activity as part of completing their contracts, even if their contracts did not require it (Statistic Finland, 2014b). One-third of the enterprises reported having had procurement contracts in 2012 to 2014 to provide products to the public sector. It was not very common that innovation activity would have been a requirement of the contract. Only 2% of enterprises reported of innovation activity related to implementing the procurement contract with innovation being required in the contract in 2012 to 2014. However, it was more common that the enterprise had innovation activity related to the implementation of the contract without the contract requiring innovation activity. Seven per cent of all enterprises, for example, 13% of medium-sized service industry enterprises and 21% of the largest enterprises, reported innovation activity related to the implementation of the contract without the contract requiring innovation activity. Thus, it’s too early to assess the volume, performance and impacts of these demand driven measures, but as objectives, these are welcomed from a R&I policy perspective.

Internationalisation of companies is a must for a small country like Finland. The KOF index is widely used as an overall measure of integration to the rest of the world. In the 2016 survey Finland ranks 11th among 91 nations. In the sub-index of economic and social globalization, Finland is 17th, being below its closest peer countries. Finland is highly integrated in the global financial system, but much less globalized as far as social and trade globalization are concerned. The observation fits well with the findings of the modest internationalisation level of research system, export development and share of foreign affiliates of multinationals. Furthermore, the globalization of the Finnish economy and society has slightly decreased over the past 10 – 15 years, compared to other smaller countries (ETLA, 2016). For these reasons, internationalization has a high priority in the Finnish industrial and innovation policy. The Team Finland network is the Government's tool for boosting the internationalization of companies. Team Finland’s strategy was updated in 2015, and it will be reinforced by intensifying cooperation between the various actors.
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<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Full Description</th>
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<tbody>
<tr>
<td>BERD</td>
<td>Business Expenditures for Research and Development</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<td>ELY</td>
<td>Centres for Economic Development, Transport and the Environment; Elinkeino-, liikenne- ja ympäristökeskus</td>
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<td>ERA</td>
<td>European Research Area</td>
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<td>EVCA</td>
<td>European Private Equity and Venture Capital Association</td>
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<td>FDI</td>
<td>Foreign Direct Investments</td>
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<tr>
<td>FTE</td>
<td>Full Time Equivalent</td>
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<tr>
<td>GBAORD</td>
<td>Government Budget Appropriations or Outlays on R&amp;D</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GERD</td>
<td>Gross Domestic Expenditure on R&amp;D</td>
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<td>HEI</td>
<td>Higher Education Institutions; Korkeakoulut</td>
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<td>HGF</td>
<td>High Growth Firms</td>
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<td>ICT</td>
<td>Information and Communication Technology</td>
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<td>INKA</td>
<td>Innovative Cities Programme; Innovatiiviset kaupungit -ohjelma</td>
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<td>IU</td>
<td>Innovation Union</td>
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<td>JRC</td>
<td>Joint Research Centre</td>
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<td>MEC</td>
<td>Ministry of Education and Culture; OKM, Opetus- ja kulttuuriministeriö</td>
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<td>MEAE</td>
<td>Ministry of Economic Affairs and Employment; TEM, Työ- ja elinkeinoministeriö</td>
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<td>NRP</td>
<td>National Reform Programme; Kansallinen uudistusohjelma</td>
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<td>PRO</td>
<td>Public Research Organisation</td>
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<td>RIC</td>
<td>Research and Innovation Policy Council; TIN, Tutkimus- ja innovaationeuvosto</td>
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<td>RIS3</td>
<td>Research and Innovation Strategies on Smart Specialisation</td>
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<td>RTDI</td>
<td>Research, Technological Development and Innovation</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
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<td>R&amp;I</td>
<td>Research and Innovation</td>
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<td>SA</td>
<td>Academy of Finland; Suomen Akatemia</td>
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<td>SBA</td>
<td>Small Business Act</td>
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<td>SHOK</td>
<td>Strategic Centre for Science, Technology and Innovation;</td>
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<td>SITRA</td>
<td>Finnish Innovation Fund; SITRA - Suomen itsenäisyyden juhlarahasto</td>
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<td>SME</td>
<td>Small and medium sized enterprise</td>
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<td>SRC</td>
<td>Strategic Research Council; STN, Strategisen tutkimuksen neuvosto</td>
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<td>Tekes</td>
<td>Finnish funding agency for innovation; Innovaationahoituskeskus Tekes</td>
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<td>VC</td>
<td>Venture Capital</td>
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<td>VIGO</td>
<td>Business accelerator; VIGO-kiihdyttämöohjelma</td>
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<td>WEF</td>
<td>World Economic Forum</td>
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<tr>
<td>YIC</td>
<td>Young Innovative Company; NIY, Nuori innovatiivinen yritys</td>
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## Factsheet

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<td>GDP per capita (euro per capita)</td>
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<td>36500</td>
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<td>18.87</td>
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<td>Employment in manufacturing as share of total employment (%)</td>
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<td>Employment in services as share of total employment (%)</td>
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<td>Share of Foreign controlled enterprises in the total nb of enterprises (%)</td>
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<td>1.21</td>
<td>1.23</td>
<td>1.26</td>
<td>1.24</td>
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<td>Labour productivity (Index, 2010=100)</td>
<td>96.8</td>
<td>100</td>
<td>101.6</td>
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<td>New doctorate graduates (ISCED 6) per 1000 population aged 25-34</td>
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<td>1.16</td>
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<td>Summary Innovation Index (rank)</td>
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<td>4</td>
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<td>Innovative enterprises as a share of total number of enterprises (CIS data) (%)</td>
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<td>52.6</td>
<td>55.3</td>
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<td>Innovation output indicator (Rank, Intra-EU Comparison)</td>
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<td>Turnover from innovation as % of total turnover (Eurostat)</td>
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<td>Country position in Doing Business (Ease of doing business index WB)</td>
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<td>13</td>
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<td>Ease of getting credit (WB GII) (Rank)</td>
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<td>Online availability of public services – percentage of individuals having interactions with public authorities via Internet (last 12 months)</td>
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<td>68</td>
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<td>GERD (as % of GDP)</td>
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<td>GBAORD (as % of GDP)</td>
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<td>R&amp;D funded by GOV (% of GDP)</td>
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<td>0.91</td>
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<td>BERD (% of GDP)</td>
<td>2.68</td>
<td>2.59</td>
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<td>Research excellence composite indicator (Rank)</td>
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<td>Percentage of scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country</td>
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<td>10.46</td>
<td>10.57</td>
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<td>Public-private co-publications per million population</td>
<td>89.37</td>
<td>85.58</td>
<td>86.51</td>
<td>76.83</td>
<td>70.58</td>
<td>69.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>World Share of PCT applications</td>
<td>1.01</td>
<td>0.98</td>
<td>0.88</td>
<td>0.89</td>
<td>0.79</td>
<td>0.79</td>
<td>0.66</td>
<td></td>
</tr>
</tbody>
</table>
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