Chapter:
5. Framework conditions for R&I and Science-Business cooperation

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Abstract

The 2015 series of RIO Country Reports analyse and assess the policy and the national research and innovation system developments in relation to national policy priorities and the EU policy agenda with special focus on ERA and Innovation Union. The executive summaries of these reports put forward the main challenges of the research and innovation systems.
5. **Framework conditions for R&I and Science-Business cooperation**

5.1 **General policy environment for business**

According to the World Bank “Doing business index”, there is a favourable environment for business in Finland. The overall ranking of Finland in 2015 was 9th (8th in 2014), the third highest of European Countries after Denmark (4th), Norway (6th) and United Kingdom (8th). Finland ranked among the top 20 countries in *Resolving Insolvency* (time and cost to resolve bankruptcies, ranking 1st), *Trading Across Borders* (the costs and procedures involved in importing and exporting, 14th) and *Enforcing Contracts* (the ease or difficulty in enforcing commercial contracts, 17th) indexes. The lowest scores Finland received in *Protecting Minority Investors* index (ranking 76th), the sixth lowest of all OECD high-income countries. In other areas Finland ranked between 21st and 38th (*Doing business 2015*).

Regarding the insolvency resolving indicator, Finland stand out especially in the average duration and costs of bankruptcy proceedings and recovery rate (how many cents on the dollar secured creditors recover from an insolvent firm). The average duration of bankruptcy proceedings in Finland was 0.9 years, compared to OECD average of 1.7 years. The average costs were 3.5 % of estate’s value (OECD average 8.8 %). Recovery rate in Finland was 90.2 %, compared to OECD average of 71.9 % (*Doing business 2015*).

Finland ranks high also on WEF Global Competitiveness Index (GCI) (overall ranking 8th in 2015), although dropping four places from previous year. In 2015, Finland was among the top 5 performers in institutions (1st), health and primary education (1st), innovation (2nd), higher education and training (2nd). Lowest scores Finland received in market size (59th), macroeconomic environment (36th), labour market efficiency (26th) and – perhaps surprisingly – infrastructure (25th) (*WEF 2015*).

According to IMD (International Institute for Management Development) Competitiveness Scorecard, Finland is among the five most competitive countries in areas of education, societal framework, health and environment, management practices and business legislation, but falls behind in factors related to labour markets, fiscal policy, employment, international investment and trade as well as domestic economy, prices and public finance (*IMD 2015*).

5.2 **Young innovative companies and start-ups**

Supporting the business environment of start-ups and young innovative companies (YIC) (or high-growth-firms (HGFs)) is a top priority in the Finnish research and innovation policy. The policy makers are aware of the economic importance of new start-ups and YICs in creating new jobs, growth as well as other positive effects to the economy. Enhancing this kind of dynamism and structural change is seen vital in Finland, where traditionally, few strong sectors and large companies have dominated.

The importance of developing policies for YICs and start-ups is stated in the Research and Innovation Council guidelines for 2015–2018. The report highlights the need to strengthen the equity market for start-ups and growth enterprises by targeting public funding at start-up phase companies facing the greatest risks. In addition, the report highlights the need to encourage private investors, funds and financial institutions to target more funding at early-phase companies as well as strengthening non-conventional funding alternatives (e.g. crowdfunding, intermediate phase funding) (*RIC, Reformatory Finland 2014*).
Tekes is the main public actor for YICs and growth-oriented start-ups. Already in 2006 it was decided that Tekes should have stronger impact on generating new start-ups, growth companies and new business lines in existing companies. The Young Innovative Companies (YIC) programme was launched in 2008. It is the main funding instrument for YICs in Finland. By providing funding up to €1.25m (covering up to 75 % of the total costs), YIC aims to substantially accelerate the global growth of the most promising small companies. The programme is very selective and designed for companies that aim for international ambitious growth and that have been in operation less than 6 years and have proven its business concept. Funding is provided in three phases (€250,000 grants + €250,000 grants + €750,000 loans), each dependent on the achievement of specific milestones. By 2015, a total of 260 companies have been selected to the programme and 75 companies have completed all three funding phases (Tekes YIC). According to external evaluations, the results of the programme have been very promising. A key feature of the programme is its comprehensive approach for the company development: besides funding, the programme helps companies by providing non-financial support (e.g. mentoring) (Assessment of YIC).

In 2013 Tekes introduced a “Planning for Global Growth” instrument (KKS) with the purpose of helping companies examine their readiness for achieving rapid international growth. The maximum funding for companies less than 5 years old is €50,000 and for other growth-oriented companies €100,000. The funding must comply with the EU de minimis regulation (Tekes KKS).

Another important instrument for YICs is VIGO business accelerator programme, established in 2009. The purpose of VIGO is to bridge the gap between early stage technology firms and international venture funding by combining public and private funding. By 2014 the share of public funding was around 26 % of the total funding. The programme is implemented through independently run companies (currently 9), who act as “co-entrepreneurs” and invest in the companies they work with. Tekes is responsible for the implementation of the programme and it is coordinated by an independent contractor (VIGO). According to an external mid-term evaluation, VIGO has been successful in achieving its early-stage goals (Mid-term evaluation of VIGO). Science|Business Innovation Board assessment of the YIC and Vigo programmes uncovered good evidence on their success (The impact of high-growth entrepreneurship policy in Finland).

Tekes Venture Capital Ltd (established in July 2014) invests in VC funds which invest in early stage Finnish companies. The purpose is to develop Finland’s VC market by “fixing shortcomings that exist in the availability of funding for the initial stages of the operations of a company”. In the new government Programme additional funds of €10m will be allocated to Tekes Venture Capital Ltd (Tekes VC).

The Team Finland LetsGrow Financing Programme combines advisory services for internationalisation (Finpro), grants (Tekes) and loan financing (Finnvera). The programme is open to internationally growing SMEs with a stable financial standing and a turnover of some €5–50m. Thus, although the programme manifests the focus on internationally oriented growth companies, it should not be considered an instrument especially for start-ups (TF Letsgrow).

Other instruments, not considered especially for start-ups but having a clear impact on the birth of new start-ups, has been established due to Nokia’s subsequent restructuring. For example, within Nokia’s new career support programme (the Bridge Programme) some 400 new firms were founded between 2011 and 2013, many of which classify as new innovative firms. Microsoft will continue with its own career support programme Polku.

In parallel with public policy attraction to start-ups, there have been significant grassroots level initiatives to bolster start-ups. Although similar initiatives have emerged in many cities (see for example BusinessOulu), the most recognised initiatives are arguably those emerging around the Aalto University, e.g. the Start-up Sauna accelerator and especially SLUSH start-up event, which attracts more than 10,000 attendees (start-ups, international investors, executives and media) from all over the world. These initiatives have also received some public support, but they should be seen first and foremost as bottom-up initiatives. Yet, the government is looking for new means to facilitate this type entrepreneurial ecosystem development. (Startupsauna, SLUSH)

Despite introducing significant cuts to public R&D expenses, the new government Programme aims to enhance the funding, equity capital and risk-taking capacity of start-ups and YICs. The cuts to Tekes’ budget are likely to harden the funding for large businesses and research organisations as the needs of young companies and SMEs will be prioritised. Combined with the additional investments to Tekes Venture Capital Ltd, it is evident that the focus of the Finnish R&D system will take a further shift towards start-ups and YICs in the coming years.

5.3 Entrepreneurship skills and STEM policy

Strong human resource base is one of the core strengths of Finland. The very high quality of primary education (ranked 1st in WEF Global Competitiveness Index in 2015) provides a strong foundation. Also the higher education system in general (4th) as well as the quality of math and science education (2nd) has been ranked very high by WEF. Finland has also been very successful in PISA rankings. In 2012 Finland was the second best OECD country in scientific literacy, third best in reading literacy and sixth best in mathematical literacy. However, despite still being one of the best countries, especially the drop from 1st place in 2003 to 6th place in 2012 in mathematical literacy spurred wide public discussion on the quality of Finnish education (PISA, WEF 2015).

According to OECD STI Scoreboard, human resources in science and technology (HRST) play a key role in innovation. The share of professionals and technicians of total employment is relatively high (over 40 %) in Finland compared to OECD average (around 30 %). However, for example in Sweden, Denmark, Norway and US the share of HRST is higher than in Finland (OECD STI Scoreboard 2013).

As for the entrepreneurship education, Finland is one of the few countries who have published guidelines for entrepreneurship education. The guidelines, published in 2009, highlighted the importance of entrepreneurship education and identified priorities for each education level. For higher education the priority areas included the developing qualification system for entrepreneurs, developing apprenticeship training in entrepreneurship, enhancing SME personnel’s competencies and promoting regional cooperation between different stakeholders. In 2009, the ministry also published a specific study on the topic. The report proposed several recommendations on promoting entrepreneurship in higher education. More recently, the Education and Research action plan for 2011–2016 stated that entrepreneurship education should be strengthened at all education levels. The new government programme introduced significant cuts to education budget. It is not yet clear how these cuts will affect the entrepreneurship or STEM education (MEC 2009) (MEC 2009b).

Although entrepreneurship is an important cross-cutting theme in the Finnish government Programme, it does not include any specific national level actions for the development of entrepreneurship education. However, there are several grassroots-level initiatives to promote entrepreneurship in education. Some of them are mentioned here:
The LUMA Centre promotes science and mathematics studies. It is a national network of different LUMA Centres at universities around Finland. It aims to ensure high level of scientific literacy and knowledge of STEM and sufficient number of skilled experts in the STEM fields (LUMA Center).

Junior Achievement Finland and YES. JA Finland aims to advance entrepreneurial attitudes and increase knowledge of entrepreneurship through schools, universities and other educational institutions. YES is an entrepreneurship education service for teachers, provides training in entrepreneurship education and services for developing entrepreneurship in schools and establishing school-business networks. It is also responsible for JA Finland’s regional services (JA Finland) (YES).

Startup Life is a non-profit internship programme for students with entrepreneurial aspirations. It offers students an opportunity to work with start-ups in Silicon Valley. It is run by Aalto University and Startup Sauna (StartupLife).

Federation of Finnish Entrepreneurs, together with universities and other stakeholders, has conducted various other individual initiatives and concepts for promoting entrepreneurship in education organizations.

In the latest WEF Global Competitiveness Index Finland ranks 10th in Extent of staff training and 4th specialized training services (WEF 2015).

5.4 Access to finance

According to the Annual Report on European SMEs 2013/2014 15 % of SMEs see access to finance as the most pressing problem in 2013. The questionnaire of the Confederation of Finnish Industries (July 2015) indicates that 7 % of SMEs in Finland have had remarkable difficulties in access to finance. The Conjecture barometer (August 2015) indicates that only 6 % of industrial SMEs and 2 % of service sector SMEs have difficulties in access to finance. These figures may not be exactly comparable to the figures of the European SME report but may indicate that access to finance is not a major problem in Finland in general. On the other hand RIC states that the lack of Finnish capital is a challenge to the funding of start-ups and growing enterprises. Limited risk-taking ability of investors, requirements of high return on invested capital, and the division of capital into a number of small investments are seen as restrictions to the availability of funding. Thus, access to finance is especially a challenge for internationalising growth companies which also are crucial for renewing the structure of the national economy and increasing productivity through reallocation of resources (creative destruction). That's why the priorities of the Finnish innovation policy have changed more towards start-ups, growth companies and commercialisation of research. The government has allocated more capital to FII (Finnish Industry Investment Ltd), and increased and enlarged Finnveras financing mandate and its risk taking.

Venture capital and business angel networks

Looking at the FVCA’s (Finnish Private Equity and Venture Capital Association) VC market statistics of the PE industry, VC investments in Finland were 0.06 % (as a % of GDP, 2014) which is the second highest value among European countries (FVCA, VC/PE

Industry in Finland 2014). All PE investments were 0.35 % of GDP, a bit more than the EU average (0.28 % of GDP).

VC investments are often syndicated or they are dependent on other risk taking funds. FVCA listed all early stage investments and Tekes’ funding for Finnish young growth companies in 2014:

- PE (seed, start-up, later stage venture), includes international investments €124m
- BA (members of FIBAN who answered the survey) €33m
- Other VC (BA and public; estimate) €11m
- Tekes YIC funding, directly or through VIGOs €28m
- Tekes R&D grants for young (less than 6-years old) enterprises €32m
- Tekes R&D loans for young (less than 6-years old) enterprises €71m

Total €299m

According to the IU progress report at country level (key indicators) in 2012 total invested venture capital in Finland was 0.24 % (as a % GDP), whereas the EU average was 0.29 %. Thus, it seems that venture capital under management in Finland is below the EU average but yearly VC investments are comparatively high. In connection with VC investments, it is beneficial to consider the functionality of start-up ecosystem as a whole. Regarding the start-up ecosystem, it seems to work well thanks to a good cooperation between all actors in the ecosystem (see Chapter 5.2). However, it is difficult to say if the situation is a longer term trend or just a momentary improvement. The consensus in Finland at the moment seems to be that the major challenges are more related to the later stage PE investments.

Finland has had co-investments programmes in place for many years. The government has long been a player in the seed and early-stage market through Sitra, the Finnish Innovation Fund. Veraventure Ltd was established in 2003 as a venture capital investment company serving as the hub for public early-stage venture capital investment. In addition to Finnvera’s seed fund, Vera, the government has established a new 45M EUR fund focused on the commercialisation of innovations. Unlike previous schemes, the government only invests in companies if the private sector invests, therefore investment decisions are made mostly by the market and private sector.

5.5 R&D related FDI

According to Statistics Finland, at the end of 2013 the value of foreign direct investments (FDI) to Finland totalled €63.2b. Direct investments were made particularly from Sweden (52 %), the Netherlands (16 %) and Denmark (7 %). Investments to Finland focused mainly on financing and insurance activities and the industry of other services.

Lately Invest in Finland (as part of the Team Finland) has started to keep more detailed records of corporate investments in Finland. According to them, in 2014 the FDI increased slightly. During that year, 229 new foreign owned companies were registered in Finland during 2014 (213 previous year). Most of them came from Sweden, UK and USA. The investments made focused on the ICT sector, business services, healthcare, retail and environmental technologies. The availability of a competent work force is one of the key factors influencing investment decisions. The structural reforms in the Finnish ICT sector have increased the availability of skilled workforce and attracted foreign companies to locate, with significant investments. Most potential investment areas in

5 http://www.fvca.fi/files/920/Pa_a omasijoittaminen_Suomessa_2014.pdf
Finnish ICT are for example, vehicles, smart traffic, health, gaming industry, wireless technologies, industrial internet and cyber security (Finpro, 11.3.2015).

It is however difficult to define and measure which part of the FDI is actually targeted to research and innovation activities. Intramural R&D expenditures of multinational corporations and international VC investments may however indicate it. They were €562m in 2011 (11% of BERD), (OECD: AMNE Database – Activity of Multinational Enterprises). This data does not match well with the national statistics according to which foreign R&D funding of enterprises was €251m in 2011. The mismatch reflects the challenges in collecting this kind of data. On the other hand foreign R&D funding of enterprises according to the national statistics, was €539m in 2013 which is close to the AMNE Database data. The intramural R&D expenditures of multinational corporations indicate mainly the foreign affiliates’ share of overall entrepreneurial activity in a country. In Finland the share (of turnover) has been quite low varying between 17 % and 22 % and being 18 % in 2013 (Statistics Finland 2014, Foreign affiliates in Finland).

Also according to OECD statistics, the R&D expenditure performed by foreign-controlled affiliates in 2009 was only 14.5 % - much less than in e.g. Canada (35.4 %), Norway (30.5 %), Netherlands (30.2 %), Sweden (29.6 %) or Germany (27.3 %) (OECD Science, Technology and Industry Scoreboard 2013).

Inward FDI stock as a % of GDP was in 2012 in Finland 38.1 % (EU28 average 30.1 %). International VC investments (institutional, private) can be estimated from the data of the FVCA (Finnish Venture Capital Association). Foreign VC/PE investments in 2014 were €50m, 0.025% of GDP.

5.6 Knowledge markets

The Finnish Patent and Registration Office (PRH) is the organisation responsible for services connected with protecting IPR in Finland. Centres for Economic Development, Transport and the Environment (ELY centres) are the regional providers of IPR related services. PRH and ELY centres promote innovation and the technical and commercial exploitation of inventions related to IPRs. They assist inventors in questions related to patenting and other industrial property issues, product development and funding applications. PRH and ELY centres participate in conferences, seminars, trade shows and fairs introducing their services and providing IPR related information. The ELY innovation advisors are contact persons for the Product Track service. Nationally, the applications for first stage development aid for inventions can be submitted to the Product Track service at the ELY Centre in Helsinki. The funding is primarily intended for microenterprises that want to develop their innovative ideas and inventions into business. The grant paid to companies for these invention development projects accounts for maximum of 50% of the approved costs. The aid granted is subject to de Minimis conditions.

Tekes funding for enterprises allows the services purchased externally for the acquisition of IPR to be included on the eligible costs for SMEs. In Tekes funding for research organisation (Tekes, General Terms and Conditions for Public Research Funding) the public availability of project results and the rights to the commercial use of project results are defined. This practice normally leads to companies and research organisations agreeing separately how the IPR is shared before project starts. A model agreement of Tekes can be used. Support for the commercial exploitation is related to the internationalisation (see Chapter 4.2). The statistics of the public funding to support IPR and commercial exploitation is not collected in Finland.

The number of national patent applications has been decreasing for several years but the number of international applications has increased until 2008 and after that remained about at the same level. This indicates the importance of global markets for a small economy such as Finland. The ratio of PCT patent applications per billion GDP (in current

PPS, 2010) was 10.4, (EU average 3.9). PCT patent applications by researcher (2010) was 0.027 (EU average 0.02).

License and patent revenues from abroad as a % of GDP (2012) was 1.34, (EU average 0.59). Community trademark (CTM) applications per million populations (2012) was 196, (EU average 152). Community design (CD) applications per million populations (2012) was 52, (EU average 29) (PRH, Statistics over patent applications and patents and WIPO, Statistical Country Profile).

While statistics on applications to national patent office are not always comparable across different countries, they can provide some indication of technological development activities that are not captured by EPO/PCT data. In Finland approximately 14 thousand patent applications were made at the EPO in the period 2000–2010. Approximately 16,000 patent applicants took the PCT route. The National Patent Office received over 38 thousand applications in this period (these three figures are based on fractional counting) (KU Leuven, Bocconi University, Patents and Licensing study for DG RTD – data release Summer 2014).

The number of national patent applications has been decreasing for several years but the number of international applications has increased until 2008 and after that remained about at the same level. This indicates the importance of global markets for a small economy such as Finland. The overview of figures regarding patent applications submitted by the Finns is presented in Table 8, (PRH, Statistics over patent applications and patents and WIPO, Statistical Country Profile). In Global Competitiveness Index Finland ranks 4th in PCT patent indicator (applications per population) (WEF 2015).

In April 2014, the government presented a new IPR action plan as part of a broader resolution on intangible value creation. The resolution on the previous IPR strategy was done in 2009 and it highlighted the importance of an effective IPR policy for the Finnish economy. It identified various actions for supporting the IPR environment. These included strengthening of the knowledge base and competence on IPR issues and assessing the bottlenecks of national IPR regulation and contributing to the development of EU level regulation (MEE 2014). Initiatives related to open innovation and IPR issues are discussed in Chapter 5.7.

Table 1 International patent applications submitted by Finnish applicants (PRH, Statistics over patent applications and patents)⁸

<table>
<thead>
<tr>
<th>Patent applications submitted by the Finns to</th>
<th>2007</th>
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<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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</table>

5.7 Public-private cooperation and knowledge transfer

Finland, as a leading innovator, has well-developed engagement between university and business sectors, although the current economic crisis is affecting its R&I landscape and activities. Performance is notably good in terms of public-private co-publications, the share of enterprises working with academia, numbers of start-up companies and the number of university-business research agreements. Finland also has a high degree of researcher mobility to the business sector. It also implemented the EC knowledge transfer recommendation to a high degree. A range of programmes are in place to support university-business collaboration and engagement and Finland is advanced in terms of open innovation. However, there are a number of changes planned to certain knowledge transfer programmes in the coming years under the new government which decided to make some important cuts to public R&D funding.

5.7.1 Indicators

Funding: BES-funded/publicly-performed R&D

![Figure 1](image)

Figure 1 BES-funded public R&D as % of GERD (in €MLN) and % of GDP

Figure 14 shows that the level of business enterprise (BES)-funded public R&D declined since 2002 as a percentage of GERD from 2.65% to 1.62% in 2014, while in cash terms there was a peak in 2009 at €160m which declined to just over €100m in 2014.

As a percentage of GDP, it shows a rather stable trend 2002-2009 which is followed by a continual decline from 0.092% to 0.052% which is still higher than many EU-28 countries. Economic decline (and hence, GDP decline) started from industry. It is
therefore logical that the BES funded R&D started to decline first, and the impact on GOVERD came with some delay.

Figure 2 BES-funded public R&D as % of GERD and as % of GDP in 2013 in Member States

Figure 15 charts show the values of BES-funded public R&D in all EU-28 as percentages of GERD and GDP respectively.

Finland ranks below the EU-28 as a % of GERD while it is above it on % of GDP. Public-private cooperation is quite strong despite the declining trends, as although there are a number of schemes to support knowledge transfer, forms of public-private cooperation have changed. Enterprises and research organisations plan and execute cooperative projects with common goals and shared disciplines. Both give their resources, knowledge and efforts to the project without any money flows from an organisation to another, which can’t be seen in available statistics. In general, incentives to academics, skills and differences in culture when working on R&D commercialisation also play a role in opportunities for engagement on the public research side. Programmes and funding to support knowledge transfer are run by the innovation funding agency Tekes. However, the recent decision to cut public R&D funding by the new government may affect Finland’s performance in private-public cooperation in the coming years.

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9 2013 was chosen as the latest data series providing a full comparison within EU-28.
Funding: Structural funds devoted to knowledge transfer

Figure 3 Structural Funds for core R&D activities 2000-2006, 2007-2013 and 2014-2020. We use the categories: 182 (2000-2006), 03 and 04 (2007-2013) and 062 (2014-2020) as proxies for KT activities.

Finland allocated 17.5% of its structural funds for core R&D activities to technology transfer and university-enterprise cooperation primarily benefiting SMEs (62.2% for 2000-2006 and 45.5% 2007-2013). It is higher than the EU average of 15.7% for the 2014-2020 period (which was 26.1% for 2000-2006 and 30.1% for 2007-2013 respectively) though in relative terms much lower than for previous programmes.

Figure 3 provides the Structural Funds allocated to Finland for each of the above R&D categories. The red bars show the categories used as proxies for KT. Please note that the figures refer to EU funds and they do not include the part co-funded by the Member State. The categories for 2000-2006 include: 18. Research, technological development and innovation (RTDI); 181. Research projects based in universities and research institutes; 182. Innovation and technology transfers, establishment of networks and partnerships between business and/or research institutes; 183. RTDI infrastructures; 184. Training for researchers.

The categories for 2007-2013 include: 01. R&TD activities in research centres; 02. R&TD infrastructure and centres of competence in specific technology; 03. Technology transfer and improvement of cooperation networks; 04. Assistance to R&TD particular in SMEs; 74. Developing human potential in the field of research and innovation.

The categories for 2014-2020 include: 002. Research and Innovation processes in large enterprises; 056. Investment in infrastructure, capacities and equipment in SMEs directly linked to Research and Innovation activities; 057. Investment in infrastructure, capacities and equipment in large companies directly linked to Research and Innovation activities; 058. Research and Innovation infrastructure (public); 059. Research and Innovation infrastructure (private, including science parks); 060. Research and Innovation activities in public research centres and centres of competence including networking; 061. Research and Innovation activities in private research centres including networking; 062. Technology transfer and university-enterprise cooperation primarily benefiting SMEs; 063. Cluster support and business networks primarily benefiting SMEs; 064. Research and Innovation processes in SMEs (including voucher schemes, process, design, service and social innovation); 065. Research and Innovation infrastructure, processes, technology transfer and cooperation of enterprises focusing on the low carbon economy and on resilience to climate change.
Cooperation: Share of innovative companies cooperating with academia

In Finland 36.1% of innovative enterprises are engaged in any type of cooperation which is above the EU-28 average level of 31.3%. Of these, 26% of innovative companies work with higher education institutions and 23% with government, public or private research institutes which are comparatively the highest of the EU-28.

Cooperation: Technology Transfer Offices (TTOs offices), incubators and technological parks

University and research institute-based technology transfer companies in Finland include Aboatech Oy, HU, Licensing Oy, Finntech Oy, Oulutech Oy, Tuotekehitys Oy Tamlink. The main function is to commercialize the research results of their owner institutions (Technical Research Centre of Finland - VTT, Universities), in cooperation with foreign companies when needed. As private companies they are able to make commercial research, development and exploitation agreements that the universities, VTT and researchers are not willing to make because of liabilities or risks involved.

Many brokers in Finland such as the Technology and Business parks, business offices of municipalities, and business or start-up hubs of universities have a mandate to build public-private partnership networks and collaboration. Further to the IPR legislation changes (2007), the introduction of the new University law (2010) made a fundamental change with regard to organisation of knowledge transfer in Finnish universities. The new law gave the mandate and responsibility of organising the knowledge transfer and BES -collaboration to the universities. The legal status of many universities also changes, as well as their approach to IPR incentives. Since then, universities have strengthened their knowledge transfer services and overall interest in these issues. At the same time, the role of technology parks and various other (’semi-public’) knowledge transfer intermediaries have lessened, and many of those have been closed down. This is a long process and is still continuing. The network of Finnish Technology parks consist of about 29 technology or science parks around Finland. The largest are in Espoo (suburban Helsinki) and in Oulu (north Finland). Most of them support incubator activities for start-up or spin-off companies.

Figure 4 CIS survey 2012 – share of enterprises cooperating with academia

12 http://www.tekel.fi/in_english/
The areas with the highest percentage of public-private co-publications are Energy, Engineering, Materials science and Computer sciences. Overall, joint academia-business publications accounted for 5.1% of publications in 2013. This level is higher than in 2003, at 4.6% but lower than the 2009 peak of 6.1% though it remained fairly stable over the last ten years and well above the EU-28 average.

Finland had 155 public-private co-publications per million of population compared to 29 for the EU-28 (and 182 Denmark and 113 Sweden)\(^\text{13}\).

**Cooperation: Patenting activity of public research organisations and universities together with licensing income**

According to the Knowledge Transfer Study Finland performs among the top 2 for number of research agreements (231.3/1 000 research staff) yet its performance is below the EU average on patents granted (1.3/1 000 research staff), on license agreements (4.1/1 000 research staff) and on license income (22 000 Euro/1 000 research staff).

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\(^{13}\) JRC IPTS RIO elaboration on Scopus data collected by Sciencemetrrix in a study for the European Commission DG RTD (Campbell, 2013). The share of public-private co-publications is derived from the Scival platform and is also based on Scopus data (September 2015). SciVal ® is a registered trademark of Elsevier Properties S.A., used under license. The data on public-private co-publications is not fully compatible with the data included in the IUS, due to differences in the methodology and the publication database adopted.
Figure 6 License income per 1,000 research staff by country. EKTIS 2011-2012 survey

Cooperation: Companies

According to the Knowledge Transfer Study, Finland ranks 7th in terms of start-ups per 1,000 research staff at 2.2, above the 1.7 EU average.

Figure 7 Number of start-ups per 1,000 of research staff per country. EKTIS 2011-2012 survey
5.7.2 Policy measures

Among the legislation in the area of knowledge transfer in Finland is the University Inventions Act that came into operation in January 2007. This provided universities with the rights to the inventions made in externally funded research (rights to all inventions previously belonged to the academic inventors). This change saw an increasing focus by universities on commercialisation of research.

On the political level, innovation and research policy has been increasingly connected with societal issues (for example, globalisation, ageing, the environment and public health) that pose a challenge to growth and well-being. These challenges can be tackled with 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.

From a policy perspective, demand and user-driven innovation are central topics in the Finnish innovation policy. Within these approaches the government aims to develop competence and incentives for demand and/or user driven RDI activity, promote the cooperation between public and private actors (PPP partnerships), increase citizens’ participation opportunities and develop co-operating models and platforms (e.g. Living Labs). (MEE 2015). The guidelines for the demand and user-driven innovation policy were established in an action plan in 2010 (MEE 2010).

Tekes is the main agency providing funding and support on a national scale to knowledge transfer. There are a number of schemes to support collaboration, internationalisation and start-ups.

Strategic Centres for Science, Technology and Innovation (SHOK) have been an important instrument to support R&D collaboration between research organizations (universities, applied sciences, research institutions) and businesses since its introduction in 2008. The main goal of SHOKs is to renew industry clusters and to create new innovations in key Finnish business sectors. The centres implement long-term research programmes (5-10 year time span) based on collectively formulated research strategy. The activities of SHOKs are coordinated by six non-profit limited companies. The shareholders represent relevant companies, universities and research institutes. In 2014, Tekes funding for SHOKs was €88m. In addition, the Academy of Finland funded basic research carried out in SHOKs.

However, according to the government programme the government has decided to cut funding resources and to close down the special funding concept for SHOKs which has been more generous than other funding concepts.

Another key instrument for promoting public-private partnerships has been the INKA programme, however, they will also be closed down. As part of the new spearhead initiatives, the government aims to launch a set of new actions to strengthen “competence centres” based on the experiences of INKA and SHOK programmes (Finnish Government 2015).

Tekes supports collaboration between research and industry by providing funding through four different funding concepts to incentivise collaboration. Three are aimed for research organisations and one for companies. The latter has been the most effective of these, mostly targeted to big companies using funding criteria which requires companies to buy research services from HEIs or PROs (or SMEs). Thus the funding is allocated through companies to HEIs, PROs and SMEs. This funding concept has impacted a major share of funding flows from companies to HEIs and PROs. Under the new government the decision was taken to cut most of these incentives.
The most common of these is funding for public research networked with companies, which aims to achieve competence and results that can be used as a springboard for the companies’ own research and development projects. Another instrument is called “New knowledge and business from research ideas”. It is targeted to research projects, where the project group prepares the commercialisation of a research idea. Strategic research openings are aimed for projects, which create new high-level competences in areas expected to be important for businesses in the future.

The government will launch new initiatives for developing the instruments for commercialisation of research results. Also new Tekes instruments (labelled as Challenge Finland, Innovation Scout and Research Benefit) will be introduced. The government will cut €130m yearly funding and to increase €59m temporary funding for 2016-2018 (altogether, not yearly). (Strategic openings)(Finnish Government 2015).

Regarding research in universities, there is an indirect incentive for cooperation as the funding model of universities rewards for outside funding, such as Tekes project funding. New government programme puts further pressure on universities and other research organisations to develop external funding sources. In addition the universities will be encouraged to develop collaboration with industry through incentives and steering processes.

Various initiatives related to open innovation have emerged recently in Finland. The Innovation Mill, launched in 2009, is a concept for commercialising “non-core” corporate IPR from large companies by spinning off start-ups and new business lines in SME’s. It is coordinated by a private service provider and funded by Tekes. Total funding of Innovation Mill in 2009-2014 has been €84m of which €42m has been public (Tekes) funding. In this case the research has already been executed - often by big companies and research organisations together - and patented, with Innovation Mill commercialising the results. (Innovation Mill)

There are also several more regional open innovation initiatives such as Demola, Protomo and Urban Mill to name a few. Most of them combine funding from various private and public sources (e.g. cities, universities, ministries, Sitra, ELY Centres and structural funds). Demola, first launched in Tampere in 2008, is an open innovation platform and university-business collaboration model, where team of students work to solve challenges presented by companies and other organizations. 80 % of the results (demos, prototypes) are bought by the companies through a specifically developed licensing system. The concept has been disseminated to various other cities in other countries. Protomo labels itself as a development for starting businesses. It provides work space, mentoring and networking for developing ideas into commercially viable business concept. According to Protomo, it has contributed to the creation of 288 start-ups since its launch in 2009. It currently operates in three Finnish cities. Urban Mill calls itself as “Co-working and Co-creation Platform Prototype for Urban Innovations”. Basically it is a physical co-creation and co-working space in the Aalto University facilities. It brings together different research and innovation actors, mostly involved with built environment, ICT and urban services. The concept was piloted in 2013 and in 2015 has been in full operation. All in all, these kind of “lightweight low threshold” open innovation concepts have become increasingly popular in Finland and represent a trend which is likely to continue in the coming years. (Demola) (Protomo) (Urban Mill)

5.8 Regulation and innovation

Improvement of the regulatory framework for business is among the top priorities in the new government Programme. The programme acknowledges that “due to excessive regulation and administration, Finland has lost its agility and competitiveness”. The government Programme further states that “The government will assess all EU regulation from the perspective of economic growth, competitiveness and jobs, and will also require a corresponding approach by EU institutions.” The implementation plan of the Government Programme identifies several actions that will reduce the regulatory burden of companies.
Much of this deregulation focuses on labour market issues or promoting open markets and competition environment. However, by the time of writing, these actions have not yet been identified in detail. It is likely that in terms of new innovations the most relevant actions are related to the priority sectors (cleantech, digitalisation, bioeconomy and health services).

5.9 Assessment of the framework conditions for business R&I

In international comparisons, the overall Finnish framework conditions for business research and innovation are systematically well-ranked, being often amongst the leading European countries. Finland indeed offers a strong competence base, good educational system, well-performing research institutions and government sector, as well as good enforcement of law overall. Finland also ranks well in patenting comparisons. Weaker aspects are, however often related to high taxation, small domestic markets and poor labour market efficiency, for example. SMEs report access to finance being one of their most pressing challenges. The small size of the domestic market is one factor why Finland is not a very attractive target for foreign direct investments, except in some very specific sectors of unique competence (e.g. software and gaming).

Over the last decade, the Finnish economy has been going through major structural reforms and the earlier strong export sectors (e.g. forestry and paper, metal industry, ICT) have radically diminished. In response, the economic policy has focused increasingly on facilitating swift industrial reforms and in supporting start-ups and high growth companies. A wealth of support instruments and programmes has been established to that end. The current policy approach does include demand-side measures (such as public procurement for innovation), while the majority are still supply-side instruments. Much emphasis has been put on increasing the performance of public policies for R&I and internationalisation through joint activities and strategic programmes; the new Team Finland and the Council of Strategic Research are prime examples in that regard.