Towards a future proof system for higher education and research in Finland

Publications of the Ministry on Education and Culture, Finland 2015:11

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Technopolis Group, March 2015

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Table of Contents

1. Introduction

Technopolis Group has been commissioned by the Ministry of Education and Culture in Finland to undertake a study of the functionality of the Finnish system for higher education and research; its performance and standing of today, and its readiness for the future, including identification of areas for improvement. The background is a growing perception in Finland that the country is losing ground, in international comparison, when it comes to its knowledge producing capacity.

The following set of questions of study has guided our work:

> *1. What are the main characteristics of the Finnish Higher Education (HE) system and how has the system developed over the last decade? How has the system dealt with the major policy trends? How does the Finnish HE system compare to other European systems? Are there differences in operating conditions and profiles of institutions depending on location (capital, regional, rural)?*
>
> *2. How does the Finnish HE system perform in terms of the three missions (education, research and utilisation)? How does the Finnish system score compared to other European countries? In which domains it is leading and in which domains it is under-performing?*
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> *3. What are the (perceived) bottlenecks in the system? What are the (perceived) strengths of the system?*
>
> *4. Is the Finnish HE system 'future proof'? What are the major trends and (internal and external) developments that will influence the Finnish HE system? In which way will it influence the system? What is the appropriate way to react to these developments?*
>
> *5. What is the way forward for the Finnish HE system? Which development proposals should be implemented?*

The Ministry, as well as the study team, have used the term 'higher education (HE) system' throughout the study, meaning the whole system formed by the universities and the universities of applied sciences and their operations including research and cooperation with the surrounding society, not only higher education.

The study has taken a mix method approach. To begin with, we have studied the past years' reports and evaluations that deal with the Finnish higher education and research system. In that respect, it has been valuable to have two Finnish-speaking experts within our team. We have also looked into national education and research statistics, and international statistics, mainly from Eurostat and OECD.

A survey has been sent out to all higher education institutions in Finland; the universities and the universities of applied sciences. We have also conducted interviews with high representatives (rectors, vice rectors, presidents, director generals, and other appointed senior specialists) throughout the Finnish system; the higher education institutions, governmental representatives, national agencies and other relevant organisations. Most interviews have been conducted over the telephone, but face-to-face interviews have been made during visits to Oulu and Tampere. Altogether 29 interviews have been conducted with 32 individuals. A list of the interviewed organisations are provided in Appendix F.

An international benchmark has also been conducted. Four benchmark countries were selected as especially interesting to compare with: Denmark, Ireland, The Netherlands and Switzerland. This resulted in a country report for each country, to be found in the appendices. A synthesis of the international benchmark forms a chapter in the main report.

Last, an international expert panel was appointed, to provide an external scholarly expert view besides our own. The panel consisted of internationally highly reputed scholars in the higher education and research policy field, both Finnish and non-Finnish. The panel was chaired by Professor Ellen Hazelkorn, and besides her comprised the following members: Professor Claire Callender, Dr Manja Klemenčič, Mr Valto Loikkanen, Professor Ulrich Teichler, and Dr Jani Ursin. During a three day visit to Finland, the panel met with and interviewed a large number of key individuals. The panel authored a report of its own, which contributed to the conclusions and recommendations by Technopolis Group. The international panel's report can be found in Appendix A.

The Ministry set up a Support Group that advised us through the work. It contained representatives from higher education institutions, ministries, the research institutes, student unions and other stakeholder organisations.

A team from Technopolis Group with consultants of seven nationalities from four of our offices has worked with the study between September 2014 and March 2015. Dr Göran Melin has been the project manager, and Dr Frank Zuijdam has organised the international panel and its visit.

We sincerely wish to thank the international panel for its commitment to the work. We also wish to thank all the people who have taken their time and participated in the interviews, filled out the survey and assisted us in organising meetings and visits. Last, we wish to thank the members of the Support Group who has generously advised us and guided us in the Finnish academic landscape.

The Ministry kindly agreed to undertake a factual review of a draft of the empirical chapters; we are grateful for the comments and corrections that we got. Technopolis Director Rebecca Allinson has made a final quality control. The authors are still fully responsible for all the content of the report.

The report reflects the opinions and conclusions of the authors.

2. The Finnish higher education system at a glance

2.1 A higher education system under reform

Finland's dual system of higher education[1] has been undergoing a significant structural reform since 2005, affecting both universities and polytechnics, also known as universities of applied sciences. The aim of this reform is to ensure that by 2020 Finland is the most competent country in the world.

The new Universities Act,[2] which came to force in 2010, set out to ensure that Finnish universities have equal operational conditions with world class universities. Universities became independent legal persons separated from the state – either as autonomous public institutions or as private foundations as is the case with two universities out of the total of fourteen.[3] Universities gained financial autonomy with greater flexibility in the acquisition of external funding and utilisation of the capital and financial assets. They are now also responsible for their human resources. Universities' public accountability has been enhanced through the mandatory inclusion of non-university representatives in the governance (at least 40% of the members).[4]

In the polytechnic sector, a two-stage reform began in 2011, about 20 years after the establishment of polytechnic sector.[5] In 2013, regulatory amendments were made to the Polytechnics Act[6] in order to accelerate the pace of the reform. The second stage took effect in January 2015 with The New Polytechnics Act. The universities of applied sciences (UAS) as we will call them henceforth in this report, have become independent legal entities and the responsibility of their core funding is transferred from local authorities to the state. Currently, all 24 UAS are non-profit registered limited companies.

2.1.1 Institutional mergers and collaboration across the dual divide

Between 2009 and 2014, the number of higher education institutions (HEI) declined from 48 to 38 through mergers. The number of universities went down from 20 to 14 (with four new universities), while the number of UAS declined from 28 to 24, Lapland Polytechnic being the most recent merger in the polytechnic sector.[7] The size of UAS vary from 1 200 to 16 000 students. The pressure for further consolidation is likely to continue in the polytechnic sector in order to guarantee better quality and cost effectiveness and to offer students greater opportunities for diverse studies. Kymenlaakso and Mikkeli UAS are expected to merge by 2017. So far the structural reform has been based on the institutions' own plans.

While the recent reforms have focused on the discrete roles, missions and responsibilities of the universities and UAS, they have also highlighted the need for

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[1] The Finnish higher education system consists of 14 universities, 24 universities of applied sciences as well as six university centres, which pool together higher education services in areas which do not have their own universities. In addition, there is Åland University of Applied Sciences in the region of Åland, the Police College which is under the steering of the Ministry of Interior, and the National Defence University which is under the steering of the Ministry of Defence.

[2] 558/2009, amended 315/2011, 932/2014.

[3] Aalto University and Tampere University of Technology.

[4] The University Reform will be evaluated in 2015–2016 and Polytechnics reform will be evaluated in 2017–2018.

[5] The first UAS began their operations on a trial basis in 1991–1992; in 2000, all UAS were operating on a permanent basis.

[6] The old Act: 351/2003; the new Polytechnics Act: 932/2014.

[7] It was established in 2014 on the basis of a merger of two polytechnics, namely Kemi-Tornio and Rovaniemi.

enhanced collaboration across the dual divide. Currently, administrative and legal barriers remain, reducing collaborative action between universities and UAS in terms of shared use of support services and infrastructure as well as shared provision of education. Bottom-up efforts have emerged, for instance in Lappeenranta, looking for new collaborative models, and in Tampere, looking for solutions for a joint vision between different types of HEIs.

2.1.2 Funding of higher education institutions

Finland has traditionally made substantial investments in education and research. In 2011, Finland invested 1.9% of GDP on tertiary education institutions, compared with the OECD average of 1.6% and the EU21 average of 1.4%.[8] Due to the public spending cuts, the spending on education and research has been cut by 10% between 2011 and 2014, amounting to 450 million Euros for the higher education sector.

Currently the state funding for higher education represents 4.2% of state budget appropriations. In 2015, the direct state funding for higher education institutions amounts to 2.7 billion Euros, while the state's competitive public research funding adds about another 590 million Euros.

Diversification of funding streams is necessary for both sectors. Private contribution to tertiary education is limited to industry and foundation funding given that Finland's constitution guarantees tuition free education for all students (apart from student union membership fees), based on the idea of higher education as a right rather than a privilege, and a generous student support system, supported by a progressive tax structures.

2.1.3 Steering higher education institutions

The higher education sector is steered through higher education legislation, national development plans for education and research, performance-based funding, performance agreements and quality assurance measures:

- Higher education legislation has a strong steering impact on the structure of the higher education system as well as the provision of education in each institution. The legislation determines what the higher education system looks like and what fields are offered. For instance a university must offer a full spectrum of higher education provision stretching from bachelors to doctoral degrees in every field which belongs to its educational portfolio. Combined with the historical and political accumulation of higher education development, the result has been a fragmentation of the offer into small subject fields, particularly in humanities and social sciences, which constrains the development of institution-specific clear profiles.
- The national development plan for education and research is adopted every four years by the Finnish government. The development plan, which is based on an elaborate system of forecasting future demand for occupations and skills, outlines the education and research policy for the forthcoming five years, covering goals, development measures and funding. The current development plan for 2011–2016 was adopted in late 2011.
- The performance-based funding formula is the means to allocate the state funding as a lump sum to institutions in both sectors. Since 2014, performance-based funding formula has been implemented also for UAS based on indicators such as the share of completed degrees and credits as well as R&D for local and regional needs. During 2015 the funding formulas for universities and UAS are being updated in close cooperation with the HEIs in order to address the needs of the

[8] OECD EAG 2014.

coming years 2017–2020. While efforts have been made to develop a more transparent and clearer funding formula in order to increase its steering effect, the elaborate indicator-based system, particularly in the case of universities, has over the years become increasingly complex because of the tendency of each government to bring new elements to the formula.

- The performance agreements between the Ministry of Education and Culture and each HEI set operational and qualitative goals for the institution and determine the resources required to reach these targets. The influence of performance agreements has been diminished due to the indicator-driven performance-based funding system for both universities and UAS.
- Thematic system-based evaluations form the basis of the national evaluation and quality assurance system. Finland has no higher education accreditation system. The Universities Act lists all universities entitled to public funding, whereas UAS are required to have a government-granted operating licence.[9] Finnish universities and UAS were audited for the first time during the period from 2005 to 2012. The second round of audits is currently being undertaken by FINEEC and will be completed in 2018.[10] Contrary to the systems that evaluate all degree programmes in the same field (e.g. the Dutch), in Finland, each institution has created its own system and is responsible for the quality and continuous development of its education provision and other operations. The evaluations are developmental in nature and aim to help institutions improve their operation. Institutions are required to perform external evaluations of their operations and quality systems on a regular basis and publish the results.[11]

2.2 Performance

2.2.1 Education

2.2.1.1 Tertiary education student entry, participation and attainment

In 2012, there were 308 900 tertiary education students in Finland. The entry rate to tertiary education (type 5A) was 66%, showing a declining trend from 2005 (73%).[12]

In 2013, Finland's tertiary education attainment rate among the population aged 30-34 years was 45% compared to an EU average of 37%. In 2005, Finland ranked sixth among the OECD countries in terms of the proportion of the tertiary educated adult population (25-64 years), whereas in 2012 Finland had dropped to tenth place. The tertiary education attainment rate shows a modest 1 percentage point decline, reflecting the fact that Finland's 30-34 age cohort is slightly higher around the years 2012–2015. Finland's national EU2020 target was 42% compared to the EU target of 40%. There is a significant disparity between tertiary education attainment level of people born outside Finland and those born in the country, respectively 33% and 47% in 2012.

2.2.1.2 Tertiary education degree production, dropout, duration of studies

From 2012 to 2013, the number of completed university master's degrees (14 444 in total) and doctoral degrees (1 700) increased by 4.4% and 5% respectively, whereas completed bachelor's degrees remained at the same level (13 000).[13]

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[9] The operating licences of all 24 UAS were renewed in 2014.

[10] FINEEC was established in 2014, on the basis of a merger of three institutions, with the aim to offer a more efficient, effective and consistent evaluation of education institutions at all levels.

[11] It is worth noting that Finnish HEIs themselves have conducted various evaluations. Parallel processes have recently begun in the university sector. The Academy of Finland has also had a tradition of discipline-based evaluations.

[12] OECD, Education at a glance, 2014.

During the same time period, the number of completed bachelor level polytechnic degrees increased by 3% (from 22 123 to 22 800), when adult education (4 011 degrees in 2013) is included. Master level polytechnic degrees increased by 14% (from 1 708 to 1 948). The increase in polytechnic degrees extends the upward trend seen in the previous four years.

In 2011, the higher education dropout rate was about 24%, compared to the OECD average of nearly 32%. Women outperform men in graduation and completion rates in all fields.[14]

The duration of higher education studies in Finland is among the longest in the OECD countries. In 2013, the median time to Master's degree completion at universities was 6.5 years. In Finland, 40% of 20-29-year-olds are enrolled in higher education, which is the second highest rate after Denmark and significantly above the average rate of 25% for OECD countries. Young people graduate later than in other OECD countries and enter the labour market at an older age. Over-extended studies are attributable to the matriculation backlog, combination of work and study, inadequate career and study advisory services, and inflexible teaching arrangements. It is also noteworthy that the university bachelor's degree is still not recognised in the labour market which may have an impact on universities which enrol students at the master level.

Recently, measures have been taken to improve the throughput and transition from secondary education to higher education and to the labour market. For instance: i) New entry rules have been introduced to favour first-time applicants to higher education; ii) The higher education selection system has been reformed with a national online application system, including a common admission system for both university and UAS programmes; iii) The funding models for both universities and UAS have been reformed (in 2013 and 2014, respectively) in order to improve completion rates and to accelerate the transition into working life; iv) The students' financial support system has been reformed in order to promote full-time studies and faster completion of studies.

The government has also reduced the study provision in a number of fields in UAS due to the shrinking age cohorts, reducing demand for labour in engineering, tourism and culture and increasing need for high-skilled workforce in the healthcare sector because of demographic changes. On the other hand, the study provision of the university and the UAS sector has been increased with 3 000 study places for the period of 2014–2015.

So far limited efforts have been made to address the lack recognition of university bachelor's degrees by the labour market as well as the fragmentation of the higher education offer. There are literally hundreds of bachelor programmes which provide early specialisation to academic major-based degrees. For example in humanities the number of entrance examinations has not been reduced, and students continue to be enrolled into narrow programmes. Recently efforts have been made to reduce the early specialisation, for instance most of the universities introduced broad-based study programmes with the aim to reduce early specialisation at the bachelor's level. But so far the Finnish university system generally lacks broad-based bachelor's degree programmes, relevant to the labour market, and quality- or problem-based master's degrees.

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[13] Of the total of nearly 30 000 university degrees in 2013, 6% were completed by foreigners (9% of Master's degrees and 18% of Doctoral degrees). Bachelor's degrees are mostly provided in Finnish/Swedish only and as such are not aimed to foreign students.

[14] Statistics Finland: Women have distinctly higher pass rates (59% vs. 37% at universities and 56% vs. 28% at UAS in 2012.

2.2.1.3 Widening participation

The combination of declining learning outcomes among the 15 year-olds in Finland and the ageing population point to the need for a greater attention on widening participation in higher education.[15]

Tertiary education policy in Finland has limited focus on widening access issues, possibly due to the robust student support system which is seen as a guarantee for equity in access. Among the OECD countries, Finland is, after Korea, the most equitable country in terms of tertiary education access by the odds ratio.[16] At the same time, the educational background of parents shows a strong correlation with the tertiary education participation of their children. In 2012, 56% of 20-34-year-olds whose parents have tertiary education were enrolled in tertiary education, whereas the same applied to 39% of those whose parents have upper secondary or post-secondary non-tertiary education, and only 5% of those whose parents had below upper secondary education.[17]

UAS typically enrol a larger share of non-traditional students. In 2012, 32% of new UAS students had a vocational degree, including some with also a high school diploma.

2.2.1.4 Graduate employment

Tertiary education in Finland brings private benefits, boosting employment outcomes and higher salary levels for graduates despite the progressive tax system. In 2014, close to 84% of tertiary education graduates (ISCED 5-6) in Finland were employed, compared with 73% of those with an upper secondary or post-secondary non-tertiary education (ISCED 3-4) and about 43% of those with below upper secondary education (ISCED 0-2). In 2013, the median income for tertiary education graduates was over 30 300 Euros per year, about 7 400 Euros more than for those with an upper secondary or post-secondary non-tertiary education (ISCED 3-4), and over 8 700 Euros more than for those with below lower secondary education (ISCED 0-2).[18]

While the risk of unemployment is lowest among tertiary educated graduates,[19] unemployment is a challenge for UAS graduates in certain fields partly due to the public sector employment requirements. So far limited action has been taken (by the state) to change these requirements which represent a barrier to the labour market. While mandatory work-based learning for UAS students (and for university students in some regulated professions) enhances graduate employability, some graduates are over-educated for their jobs. This has led to the recommendation that the quality of graduate employment should be added to the list of indicators which determine the institutional core funding particularly for UAS, along with graduate employability.

As noted above, there is a policy concern regarding the delayed access to the labour market by higher education students. Finnish students typically combine work and study to avoid of mortgage type study loans.

There are also growing concerns regarding the employability of graduates of doctoral programmes who will need to consider more diverse career opportunities than the

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[15] PISA 2012 shows that the average mathematical literacy among the 15-year-olds in Finland ranked in 12th place, compared to 2nd place in PISA 2003. The national average scores in mathematics, reading and science literacy had all deteriorated since 2003. Still, Finnish students remain among the best performers in the OECD countries: 6th in mathematics, 3rd in literacy and 2nd in science.

[16] OECD, Education at a Glance, 2014.

[17] OECD, Education at a Glance, 2012.

[18] In 2013, the median income for tertiary education graduates was 30 329 Euros per year compared with 22 946 Euros for those with an upper secondary or post-secondary non-tertiary education (ISCED 3-4), and 21 605 Euros for those with below lower secondary education (ISCED 0-2).

[19] Eurostat.

traditional university research track. This could be facilitated by introducing changes to the doctoral training.

International students who complete their tertiary education degree in Finland face serious barriers in their labour market entry. Improvements are under way, as the EU directive extending the residence permit for higher education graduates is currently being implemented.

2.2.1.5 Student mobility and export of higher education

The volume of Finland's cross-border higher education has increased but the current growth rates remain low compared to the benchmark countries. The number of new foreign tertiary education degree students increased at all levels by more than 40% from 2008 to 2012 (from 3 860 to 5 533).[20] The growth was particularly strong for master's studies and doctoral studies. In 2012, about 4% of Finland's tertiary education students were enrolled abroad,[21] whereas 5.71% of tertiary education students in Finland were foreign students, a modest 1.5% increase from 2009. In 2013, foreign students accounted for 0.8% of the university bachelor degrees, 9% of the university master's degrees and 18% of doctoral degrees, whereas 7% of the UAS degrees were completed by foreigners.

In 2013, about 77% (15 120) of all foreign degree students in tertiary education originated from outside of the EU/EEA. There were 9 500 foreign students in UAS, of which around 82% (7 772) were from outside the EU/EEA. Altogether 72% (7 348) of the 10 240 foreign university students were non EU/EEA residents.

Contrary to Denmark and Sweden which introduced fees for non-EU/EEA citizens in 2011, Finland continues to offer tuition free higher education to all foreigners. Given the absence of tuition fees, the high unit costs of tertiary education means that international students place a financial burden on the tertiary education system. Estimated costs of a tertiary education degree on the public purse range from 35 000 to 40 000 Euros per student, and even higher in the case of doctoral programmes, but no rigorous studies have been made on the benefits and costs of international students to the economy.[22]

So far, the plans to introduce tuition fees for non-EU/EEA citizens have come to a halt. Small scale experimentation was implemented in 2011 to evaluate the impact of introducing fees for students from outside of EU/EFTA countries.[23] At the end of 2014, the government proposed a fee for handling applications by individuals who have completed their pre-higher education qualifications in countries outside the EU/EEA area or Switzerland.

2.2.2 Research and development

2.2.2.1 Coordination and evaluation of R&D

The Research and Innovation Council advises the government on the strategic development and coordination of Finnish science and technology policy as well as the national innovation system. Its guidance for the period from 2015 to 2020 emphasises the need to radically restructure the higher education system, focus on the quality of research and closer collaboration between universities, businesses and research institutes, and further develop the dual model of Finnish higher education, as well as

[20] 2008: 2 354 in the UAS and 1 506 in the universities; 2012: 2 478 in UAS and 3 055 in universities.

[21] OECD EAG, 2014.

[22] Talent available – Tapping the Expat Talent Pool, EVA, Helsinki 2010 (referenced in Kiuru, 2012).

[23] The experimentation included only 24 study programmes out of the 146 originally enrolled (3500 to 11 750 Euros were collected from a total of 110 students in 2011). Economic impact of the experiment was negligible given the low number of students paying tuition. Some institutions reported administrative challenges. They also expressed fears for a decreasing number of applicants.

specialisation, and gathering competitive centres of excellence under different fields. In line with the recommendations, several efforts are under way, including work to bring together sectorial research institutes into larger units, and clarify the division of tasks between the universities and the research institutes.

The Academy of Finland reviews the state and quality of scientific research in Finland. The process is being developed towards a continuous evaluation and data collection which can be utilised for science policy needs. Individual disciplines and fields of research are assessed separately on a needs basis.

2.2.2.2 R&D funding

For over 10 years, Finland's total spending on R&D as a share of GDP has exceeded the OECD average and the corresponding levels of key comparator countries, such as Denmark, Ireland, Netherlands, Norway and Sweden.

Finland has set a national target of 4% gross domestic expenditure on R&D (GERD) as a share of the GDP. The GERD rate is at a high level in international comparison but shows a declining trend, ranging from 3.94% in 2009 to 3.55% in 2012. During the same period, higher education R&D spending as a percentage of GERD shows a modest but steadily improving trend from 0.74% to 0.77%.[24] In 2014, the share of public research funding of GDP was about 0.99% in Finland.[25] In the 2014 budget, the total appropriations and outlays for R&D amounted to 1.955 million Euros which represents a reduction of 3.6% or 42 million Euros from the previous year.

Figure 1 Government budget appropriations or outlays for R&D in 2014.[26]

	R&D funding € million	**Share of R&D funding, %**
R&D funding total	1995.1	100.0
Main administrative branches (ministries)		
Ministry of Education and Culture	991.2	50.7
Ministry of Employment and the Economy	640.1	32.7
Ministry of Social Affairs and Health	115.7	5.9
Ministry of Agriculture and Forestry	94.4	4.8
Funding to organisations		
Universities	578.9	29.6
Tekes – the Finnish Funding Agency for Innovation	513.3	26.3
Academy of Finland	322.7	16.5
Government research institutes	282.2	14.4
Other R&D funding	226.7	11.6
University central hospitals	31.3	1.6

As stated in Figure 1 over 80% of governmental R&D funding is allocated by two ministries, the Ministry of Education and Culture (50.7%) and the Ministry of Employment and the Economy (32.7%). Universities receive 29.6% of the total

[24] OECD STIS, 2013.

[25] http://www.stat.fi/til/tkker/2014/tkker_2014_2014-02-20_tie_001_en.html?ad=notify

[26] http://www.stat.fi/til/tkker/2014/tkker_2014_2014-02-20_tie_001_en.html

government budget appropriations.[27] UAS have expanded applied R&D activities, mainly with the help of the EU Structural Funds, but suffer from fragmented funding and low levels of non-competitive funding.

The Academy of Finland is the major national source of competitive funding for basic research. It has highlighted the importance of interdisciplinary research, evaluation of the effectiveness of research and problem-oriented approaches. In 2014, a new instrument was introduced and positioned to the Academy of Finland by the State Council of Finland. This is a competitive funding instrument to support long term demand-driven and problem-based research in order to address the "grand challenges" facing the Finnish society.[28]

The funding for innovation is channelled through Tekes which is the most important funding agency for innovation. In 2014, Tekes funded projects at companies and research institutions in the order of 550 million Euros.

2.2.2.3 Research staff

Research career systems vary across universities. Some universities have created a tenure track for career paths for aspiring researchers, but these have not been spread across the higher education system. In general, there is a need to make significant investments in the recruitment of students and researchers, particularly post-docs and assistant professors, in order to build the competitiveness and quality of Finnish science. Also doctoral education could be developed to better serve a wider range of career paths, including expert positions in the private and public sector.

Finland has a comparatively low level of internationalisation of its higher education and research and innovation system. The share of foreign-born R&D personnel has been less than 2% in Finland for over 10 years, significantly below the rates of Switzerland and Ireland (about 20%) and other benchmark countries (about 5%). International mobility of researchers has improved but is constrained by administrative factors and a lack of transparency in filling academic positions. More efforts are needed to increase the recruitment and retention of academic personnel from abroad and, more broadly, encourage both national and international mobility in academia.

2.2.2.4 Research output

In 2003–2011, Finland produced 116 478 scientific publications including 15.45% top cited publications (10% most cited papers).[29] From 2009 to 2012, the number of patent applications to the European Patent Office increased from 1 307 to 1 456. From 2009 to 2011, the number of triadic patent families increased from 271 to 277.

Greater efforts are required in order to take advantage of international competitive research funding, particularly the funding offered by the European Commission including Horizon 2020 and the European Research Council (ERC). The number of ERC grants shows an upward trend with 13 grants for 2013 (3 starting grants, 4 consolidator grants, 5 Advanced grants and 1 proof of concepts). The number of ERC grants to Finland is still below the numbers of the benchmark countries. From 2007 to 2014, Finland raised 866.56 million Euros from the FP7 (Seventh Framework Programme) with a success rate of 21.3%.

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[27] http://www.stat.fi/til/tkker/2014/tkker_2014_2014-02-20_tie_001_en.html

[28] The main strategic research themes and priorities for 2015 are: the utilisation of technological traditions, changing institutions, climate neutral and resource scarce society and equality and its promotion.

[29] OECD Science, Technology and Industry Scoreboard 2013. The "top cited publications" are the 10 % most cited papers.

2.2.3 Third mission

In Finland, the third mission of HEIs reflects the dual system of higher education with the different roles of UAS and universities. The UAS have an explicit legally based regional role to deliver education which is aligned with the needs of the surrounding society and industry, and they undertake applied R&D and facilitate cluster development. Universities have a more general obligation towards societal and economic engagement. Both universities and UAS have a legal obligation to include external stakeholders in their governance structures to ensure relevance of education and R&D.

In 2013, The Finnish Higher Education Evaluation Council (FINHEEC) published an evaluation of HEIs' social and regional impact which investigated how Finnish HEIs define their task of exerting social impact, how they monitor such impact, and barriers and drivers of these objectives.[30] In line with the previous OECD work, the evaluation concluded that: i) the promotion of the social impact should be defined as a separate profit area along research and education, ii) the social impact should be embedded into Finnish higher education, research and innovation policy and into the strategies and goals of HEIs, iii) HEIs should make significant efforts to develop their cooperation strategies and partnerships as well generate new businesses and entrepreneurship, iv) regional cooperation should be increased, in the design and delivery of national and regional economic strategies, v) funding systems for R&D should be developed to enhance social impact, and vi) efforts should be made to evaluate the social and regional impact of HEIs, including indicators that ultimately could be incorporated into the higher education funding models.

Efforts have been made to identify indicators for societal impact of higher education and research. For example, in 2008, the VINDI project by the Academy of Finland and Tekes defined indicators for the impact of science, technology and innovations. In 2008, a comprehensive study on the monitoring of the university societal outreach was published. In 2014, the Ministry of Education and Culture commissioned studies to focus on impact of higher education.

2.3 Conclusions

Finland continues to have a dense network of knowledge organisations: there are currently 14 universities, 24 UAS, 6 university centres and 13 state research centres. Against a backdrop of a relatively small and ageing population and increasing international competition, the higher education network appears fragmented. Pressures for further consolidation and rationalisation will continue in order to build international competitiveness, facilitate stronger profiling of institutions and develop flexible access to higher education and R&D services.

Recent reforms have led to many improvements in Finland's higher education sector. The reforms have provided HEIs with an independent legal status, changed their relationship with the government, and improved their governance systems.

At the same time Finland is losing its competitive advantages in terms of a highly educated workforce and innovation capacity. The duration of studies in Finland is among the longest in the OECD countries. The transition from school to higher education and to the labour market is slow. The combination of declining learning outcomes at schools and an ageing population point to the need for a stronger focus on equity in access to, and success in, higher education. Internationalisation of higher education and research remain key challenges due to the lack of international staff and the combination of tuition-free education provision and a lack of effort to retain highly educated foreigners in the Finnish labour market. The research output suffers from

[30] http://www.kka.fi/files/1925/KKA_0513.pdf

the fragmentation of the R&D system, lack of large scale research infrastructures and absence of big national goals for research in order to build world class excellence.

3. In international perspective

This chapter discusses and compares various aspects of the higher education systems in Denmark, Ireland, the Netherlands and Switzerland, benchmarking them against Finland.

All the benchmark countries have dual HE systems with universities on the one hand and UAS (or polytechnics/colleges) on the other. The precise configurations of the dual systems vary of course, with UAS having different missions and functions while universities are very similar in their functions in the benchmark countries. Two important issues from a Finnish point of view are compatibility between the two tracks and R&D capacity at UAS. These are issues the benchmark countries also grapple with.

It is based on individual country reports (Appendices B-E). In these, a wealth of more detailed information can be found.

3.1.1 Compatibility between the two parts of dual systems

An important characteristic of dual systems is the compatibility between the two tracks (the academic and the vocational). In the Netherlands, a six-year university preparatory education (VWO) qualifies for admittance to a university or a polytechnic, while a five-year general secondary education (HAVO) qualifies for admittance to only a polytechnic, as does a senior four-year, level 4 vocational education (MBO). There are two bridges from the vocational to the academic track. On the one hand, polytechnic students can enter university programmes with their *propaedeuse diploma* (first year diploma), and on the other hand, they can enter a university master's programme with their polytechnic bachelor degree.[31]

In Switzerland, there are also different access requirements for the two sectors, going back to different tracks (academic and vocational) in secondary education. Typically, university students would have attended an upper secondary school (gymnasium, lycée) and have a regular baccalaureate while university of applied sciences students would have completed an apprenticeship and have a vocational baccalaureate. While holders of a vocational baccalaureate cannot enter a university, holders of a regular baccalaureate have access to most study programmes at universities of applied sciences if they can document one year relevant work experience. Like in the Netherlands, universities of applied sciences bachelor graduates can enrol for a university master degree.[32] The proportion of Bachelor's degree holders who go on to acquire their Master's degree at a different type of institution is still low, albeit growing. In Switzerland there is also a discussion about allowing excellent polytechnic graduates to do a PhD at a university (polytechnics cannot confer PhD degrees).

Progression in the Irish education system is based on the ten-level National Framework of Qualifications (NFQ) (Figure 2).[33] Students in Secondary Level may choose from one of three Leaving Certificate programmes – Leaving Certificate Programme, Leaving Certificate Vocational Programme (LCVP) or Leaving Certificate Applied (LCA). The first two typically give access to tertiary education, students with LCA need to proceed to a Post Leaving Certificate (PLC) programme prior to access to third cycle education.[34] Students and graduates can transfer with ease from one type of HEI to another within the same discipline if they have the required prerequisite NFQ level certificate (e.g. NFQ level 6 to enter a NQF level 7 programme); insofar, it is a transparent system where students can transfer across the system. It is a full lifelong

[31] OECD (2008). OECD Reviews of Tertiary Education NETHERLANDS.

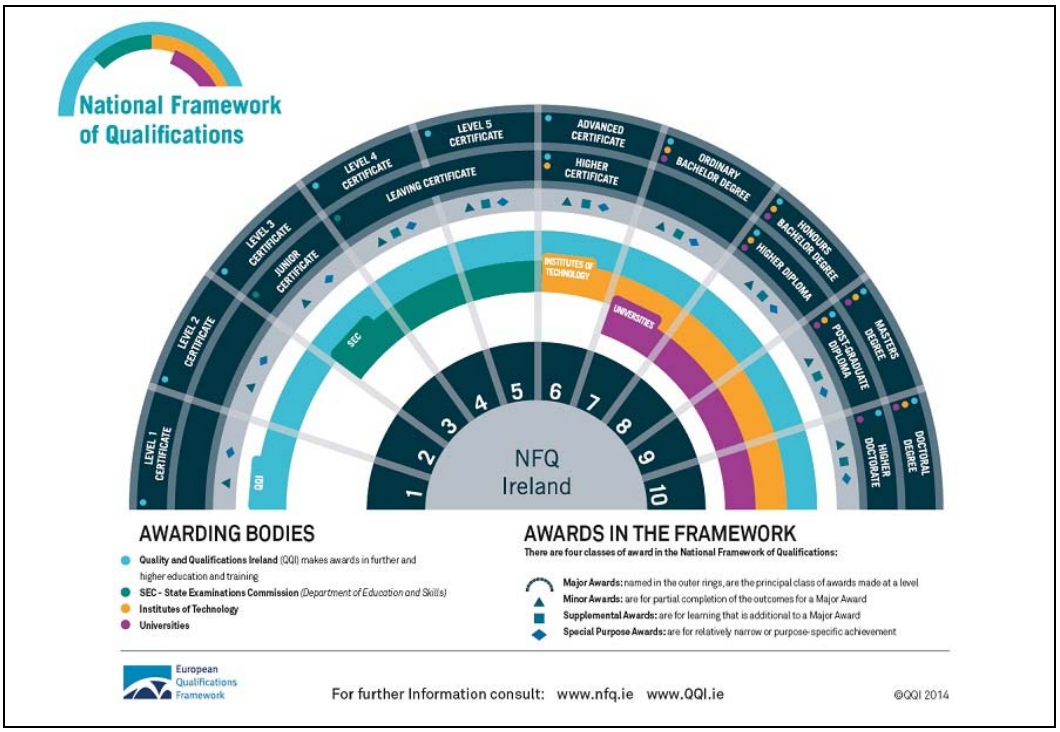
[32] Swiss Coordination Centre for Research in Education, Swiss Education Report 2014, Aarau 2014.

[33] http://www.qqi.ie/Pages/National-Framework-of-Qualifications-%28NFQ%29.aspx. For a detailed description of the Irish NQF see country report in Appendix C.

[34] http://www.careersportal.ie/ed_training/ed_categories.php?ed_sub_cat_id=8#.VPnDX1oobdk

learning system. The Institutes of Technology in Ireland offer degrees at NQF levels 6 (Higher Certificate), 7 (ordinary Bachelor's Degree) and 8 (Honours Bachelor's Degree). Universities in Ireland generally offer level 8 degrees. Further progression to postgraduate education (NQF levels 9 and 10) is offered by all universities and most Institutes of Technologies.

Figure 2. National Framework of Qualifications of Ireland



Source: QQI

In Denmark, there have been some attempts to increase collaboration and mobility between universities and university colleges but the two tracks are still quite separate. A university college bachelor's does not automatically grant access to a university master's programme.[35]

3.1.2 Education and R&D at polytechnics

Another distinction is whether polytechnics conduct R&D and have a mission to do so.

In the Netherlands, the polytechnics are beginning to build research capacities, in which they are inspired especially by the German universities of applied sciences. Therefore they build Centres of Expertise and hire so-called *lectors*. They have received special funding from the Ministry of Education, Sciences, and Culture for setting up research capacity and specialising.[36] The lector positions as well as the Centres of Expertise are the main results of these investments.

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35 Organisational features of higher education; Denmark, Finland, Norway and Sweden. Working Paper 14/2014 NIFU.

36 Ministry of Education, Culture and Sciences (2014)/ Kerncijfers 2009-2013 onderwijs, cultuur en wetenschap.

In Switzerland, universities of applied sciences are mandated to conduct applied R&D and to engage in knowledge-transfer. However, they do not have the right to confer PhD degrees. In the longer term, the universities of applied sciences are envisaged to spend 20% of their resources on research. Universities of applied sciences typically cooperate with SMEs in the region, often in the framework of cooperative projects funded by the innovation agency CTI. Universities of applied sciences are the main client of CTI, i.e. almost half of CTI project funding goes to them. More generally, the distinction made between the university sector and the universities of applied sciences sector has been remarkably stable over time, creating distinct profiles of universities and universities of applied sciences.

In Denmark, during the 2000s a number of University Colleges and Academies of Professional Higher Education offering professionally oriented programmes were established. There are a total of seven University Colleges and nine Academies of Professional Higher Education. The Danish University Colleges offer Professional Bachelor's programmes in areas such as teacher training, engineering, business, nursing, health, nutrition and social work. The Academies of Professional Higher Education offer Academy Profession (AP) degree programmes and Professional Bachelor's degree programmes.[37] University colleges must ensure that the education programmes' knowledge base is profession-based as well as development-based. They also function as regional knowledge institutions in close dialogue with regional stakeholders. Furthermore, the university colleges must work with the universities and other research institutions.[38] In 2013, the Danish parliament passed a new law concerning among other things research and development at the university colleges. The law gives university colleges the opportunity to perform practical and application-oriented research and development activities in interaction with the labour market, other educational and research institutions and society.

In Ireland, over the years the boundaries between universities and Institutes of Technology (IOTs) have started to blur with some IOTs now offering PhD programmes and doing research. On an institutional level, in the light of lack of funding some of the IOTs are aspiring to become universities, in order to gain more access to additional research funding. Against this background, there has been a new Technological Universities Bill which aims to create new universities out of IOTs. The Bill explicitly calls for the IOTs to have a different set of objectives compared to the traditional universities. The new legislation calls for maintaining the local orientation of the institutes but on a bigger scale (e.g. targeting large multinationals rather than just local companies). However, there are several concerns with regard to this change of status. First, it is not clear that IOTs will be able to maintain their (technical) focus once they move to university status. Second, it is doubtful if the IOTs will manage to adjust the profiles of their staff to truly act as research-intensive institutions, which a university is. The UK experience of turning polytechnics into universities showed that although some institutions became a bit stronger, the majority did not and, on in some cases the opposite occurred, devalued their degrees and despite the increase in budget for research did not lead to any significant increase in research outputs.

3.2 Restructuring the number of HEIs

As can be seen from Figure 3, given the size of the country and the student body, the number of both universities and UAS is quite high in Finland despite the recent mergers. The Netherlands, with almost three times as many inhabitants as Finland, has the same number of universities and 1.5 times as many polytechnics as Finland. The picture changes slightly when normalising by number of students: Finland still has the highest number of HEIs per thousand students, but it is closely followed by

[37] http://studyindenmark.dk/study-options/danish-higher-education-institutions

[38] http://ufm.dk/en/education-and-institutions/higher-education/university-colleges/about-the-university-colleges

Ireland. The Netherlands and Switzerland still have the lowest number of HEIs per thousand students but they swap ranks, with the Netherlands being the country with the lowest number of HEIs per number of students. There is nonetheless a consensus in the Netherlands that the number of HEIs is too large for the Dutch system.

Figure 3 Number of HEIs, per country

	No. of universities	No. of polytechnics	No. of inhabitants (in million)	No. of HEI students (in thousands, 2012)	No. of HEIs per million inhabitants	No. of HEIs per thousand students
Finland	14	24	5.5	308.9	6.9	0.12
Denmark	8	16*	5.7	275.0	4.2	0.09
Ireland	7	14**	4.6	192.6	4.6	0.11
Netherlands	14	37	16.9	793.7	3.0	0.06
Switzerland	12	9***	8.2	269.6	2.6	0.08

Source: Country case studies. *University Colleges and Academies of Higher Education; **Institutes of Technology; ** seven public, two private

Denmark is a recent example of a country that has restructured its research and university system, thus considerably reducing the number of universities. Denmark has eight universities and the present structure of Danish universities was implemented in January 2007. New universities were established on a basis of mergers between some universities and government research institutes: 25 universities and research institutions were reduced through mergers to eight universities and three research institutes. The mergers between universities and between universities and government research institutes were carried out in order to strengthen the university and research sector, especially in an international setting. The purpose of the mergers between universities and sectoral research institutes was to integrate applied or problem-oriented research into the universities, connecting it better with higher education and research prevalent at the universities, while outsourcing investigative and regulative functions to other agencies. However, these functions have been integrated into the universities, which at least a few years ago seemed to have caused organisational overload and weak integration of the institutes.[39] The merger processes have in certain ways acted as change drivers, although the University Evaluation from 2009 concluded that the effects of the mergers had not yet fully materialised at that point.[40] Today, in 2015, it is not unlikely that some effects of the mergers have appeared.

Restructuring of the higher education landscape has also occurred in the Netherlands and Switzerland. Both countries dramatically restructured their polytechnic sectors in the last two decades of the previous century.

In the Netherlands, in the beginning of the 1980s the polytechnics could be described as a group of about 400 independent mono-sectoral schools that were internally oriented and intensively supervised by the Ministry of Education, Culture and Sciences. Through an almost continuous series of mergers, combined with growing ambitions and increased autonomy, the polytechnics have become a rather heterogeneous group of institutions that includes large general polytechnics, often with several locations or spokes, but also a large set of specialised polytechnics, many

[39] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin.

[40] Danish University Evaluation 2009 – Evaluation report (2009).

of them art schools or Christian schools.[41] In the public debate these mergers have often been associated with decreased performance in educational terms.

In Switzerland, the seven public universities of applied sciences were created in 1997 (based on the 1995 Universities of Applied Sciences Act) as a reform and through mergers of existing professional, mostly mono-sectoral tertiary education schools. The process started in a few fields (technology, economics and business administration, construction) but the universities of applied sciences extended to most professional domains (arts, social work, health, teacher training) after 2000.[42] Like in the Netherlands, the universities of applied sciences often have several locations or spokes, normally spanning several cantons.

In Ireland, some IOTs are considering a merger. The aim of such a merger is to create stronger institutions. This has to be seen against the background of current developments in the polytechnic sector, e.g. the New Technological Universities Bill currently discussed in parliament. All IOTs and universities are now grouped into regional clusters with the purpose of improving quality of teaching, learning and research. Three consortia of IOTs are already approved to progress towards planning as designated technical universities.

In the Netherlands, there have also been a number of attempts of universities and polytechnics to join forces; one of them is considered a success to some extent. These mergers were forced by various factors, including ideological ones (universities and polytechnics affiliated to similar churches combining forces), strategic ones (the need to cover large parts of the country in a polytechnic/university consortium), and efficiency. However, one of the main rationales for such consortiums – that is minimising difficulties to transfer between polytechnics and universities for students; solving inflexibility and rigidity – has not been structurally solved.

In all the benchmark countries, the polytechnics, unlike the universities, are distributed over the country more evenly than universities, which is a result of their clear roles in regional labour markets and in conducting (contract) research and providing services to the regional industry. This can for example be seen in the distribution of universities and polytechnics in the Netherlands (Figure 4). However, it has to be noted that all the benchmark countries are more evenly populated than Finland. None of them has anything resembling the vast territories that Finland has in the north.

[41] Leijnse, F. (2002), Hoger onderwijs: Europees cultuurgoed in nationaal kleed. Ward Leemans Lezing Katholieke Hogeschool Leuven; Riet, S.P. van 't (2013), Slimmer in 2030. Geschiedenis en toekomst van het hoger onderwijs in Nederland. Amster dam: VU University Press.

[42] Benedetto Lepori, Jeroen Huisman, Marco Seeber, Convergence and differentiation processes in Swiss higher education: an empirical analysis, in: Studies in Higher Education, 2012, 1-22.

Figure 4 Distribution of the 14 universities (red) and 37 polytechnics (grey) in the Netherlands

Source: VSNU; Vereniging Hogescholen

In all the benchmark countries, the polytechnics receive less money than the universities. Given the differences in HEI funding streams in the benchmark countries, comparison between them is difficult. The figures we are comparing correspond more or less to institutional funding. Nonetheless, the proportions given below should be regarded as rough estimates only, giving an idea of the order of magnitude in funding for the different types of HEIs.

In the Netherlands, polytechnics receive approximately €2.5 billion per annum from the Ministry of Education, while the Dutch universities receive €3.3 billion (first funding stream).[43] Hence, the proportion of funding from the Ministry of Education is 0.75 : 1 for polytechnics compared to universities. In Ireland, in 2014, universities received a total of €528 million from the Higher Education Authority, Institutes of Technology €349 million.[44] Here the proportion of IOT funding to university funding was 0.66 : 1. In Switzerland the difference in funding between the two types of HEIs is particularly striking, with the proportion of institutional funding for polytechnics compared to (cantonal and federal) universities being roughly 0.24 : 1.[45] [46]

3.3 Shares of higher education graduates

All the countries have attained the EU 2020 target of at least 40% (also the non-EU Member State Switzerland). In 2013, Ireland showed the highest graduation rates in Europe (52.6% of the population aged 30-34 attained tertiary education). Ireland is following a mass education policy and expects more demand for places – both full-time and part-time – over the next fifteen years. In Denmark, while the share of adults aged 30-34 who have attained tertiary education is above 40%, the government's goal is that that 60 per cent of a youth cohort is to complete a higher education by 2020 and at least 25 per cent is to complete a long-cycle higher education (Master's

[43] Both types of HEIs have other funding streams as well, e.g. tuition fees and income from contract research and education. For further information please consult the Dutch country report in Appendix D.

[44] http://www.hea.ie/sites/default/files/flowchart_of_funding_for_website2014.pdf

[45] For more detailed information on funding see the Swiss country report in Appendix E.

[46] No such figures could be identified in the case of Denmark.

programme). The Netherlands has always aspired to have a tertiary education participation rate (not graduation rate) of 50% of its population by 2010; this goal has been attained. In Switzerland, targets in terms of quantity regards the participation rates at upper secondary level rather than increasing the number of graduates.[47] Figure 5 presents the tertiary education attainment rates per year and country.

In all the countries, younger people are more likely to have tertiary level education than older generations. While this trend has a different pace in different countries, differences between the benchmark countries in educational attainment rates of the younger generation are not very high.

Figure 5 Tertiary educational attainment, by year and country

Tertiary educational attainment (% of population aged 30-34)	**2008**	**2010**	**2011**	**2012**	**2013**
EU 2020 target at least 40%					
Finland	45.9	45.7	46.0	45.8	45.1
Denmark	40.7	41.2	41.2	43.0	43.4
Ireland	48.9	50.1	49.7	51.1	52.6
Netherlands	40.5	41.4	41.1	42.2	43.1
Switzerland	43.4	44.2	43.8	43.8	46.1

Sources: Eurostat

3.3.1 Completion rates

Completion rates are highest in Denmark (80%), followed by Finland (76%) and the Netherland (72%) (no figures are available for Ireland and Switzerland) (Figure 6). In the Netherlands, completion rates have always been an issue: "The proportion of students who graduate, and the speed of their graduation, could be better".[48] This might be related to the fact that students in Dutch universities and polytechnics have traditionally demonstrated low motivation for their studies.

Figure 6 Completion rates (2011) (tertiary-type A education), by country

2011	**Men and Women (in %)**	**Men (in %)**	**Women (in %)**
Finland	76	66	83
Denmark	80	77	83
Ireland	na	na	na
Netherlands	72	65	78
Switzerland	na	na	na

Source: OECD Education at a glance, 2013

In all the countries women have a higher completion rate than men. The completion rate of men is very similar in Finland and the Netherlands, but considerably higher in Denmark.

[47] Marco Seeber, Erawatch Country Reports 2013: Switzerland, Luxembourg 2014.

[48] OECD (2008). OECD Reviews of Tertiary Education NETHERLANDS.

3.4 Employability of higher education graduates

In all the benchmark countries employment rates are highest for people with tertiary education (Figure 7), as can be expected. Moreover, employment rates do not differ very much among the benchmark countries, with the exception of Ireland whose economy was hardly hit by the financial crisis. Also, in all the benchmark countries the median income is heavily influenced by the level of education.

Good employment rates for people who have attained upper secondary education can be observed in Denmark, the Netherlands and Switzerland. In the same countries there is also a fairly high employment rate for people with less than primary, primary and lower secondary education. This reflects the strengths of the benchmark countries' economies and labour markets.

Figure 7 Employment rates, by year and country

Employment rate by highest level of education attained (y15-64)	2009	2010	2011	2012	2013	2014
Finland						
• Tertiary (ISCED 5-6)	84.3	84.6	84.8	84.5	83.8	83.7
• Upper secondary and post-secondary non-tertiary (ISCED 3-4)	70.0	70.5	71.9	71.0	69.9	72.8
• Less than primary, primary and lower secondary (ISCED 0-2)	40.6	39.8	39.7	39.5	38.0	43.3
Denmark						
• Tertiary (ISCED 5-6)	86.3	85.7	86.5	86.7	86.1	86.6
• Upper secondary and post-secondary non-tertiary (ISCED 3-4)	77.2	77.6	77.7	76.8	76.6	76.7
• Less than primary, primary and lower secondary (ISCED 0-2)	59.3	57.5	55.4	54.2	53.7	53.8
Ireland						
• Tertiary (ISCED 5-6)	79.7	79.1	79.5	78.9	80.1	80.2
• Upper secondary and post-secondary non-tertiary (ISCED 3-4)	62.8	59.6	59.8	60.0	61.2	62.3
• Less than primary, primary and lower secondary (ISCED 0-2)	38.7	36.2	34.5	34.0	36.2	33.6
Netherlands						
• Tertiary (ISCED 5-6)	87.5	87.0	87.0	87.3	87.6	87.4
• Upper secondary and post-secondary non-tertiary (ISCED 3-4)	80.1	78.8	78.7	77.8	76.9	76.5
• Less than primary, primary and lower secondary (ISCED 0-2)	61.4	59.4	60.4	60.1	57.7	56.2
Switzerland						
• Tertiary (ISCED 5-6)	87.5	87.0	87.0	87.3	87.6	87.4
• Upper secondary and post-secondary non-tertiary (ISCED 3-4)	80.1	78.8	78.7	77.8	76.9	76.5
• Less than primary, primary and lower secondary (ISCED 0-2)	61.4	59.4	60.4	60.1	57.7	56.2

Source: Eurostat

Of course, the data in Figure 7 have been collected in the aftermath of the financial crisis, with countries getting through the crisis with more or less difficulty. Ireland took by far the hardest hit of the benchmark countries, with the banking sector collapsing and the state taking over its liabilities, which led to a harsh austerity programme in Ireland from which the country has only recently emerged.

In Denmark, employability of the Danish higher education graduates is generally good. The rate with which Danish graduates start their first job is high in comparison to many other countries, which is an indication that the skills of Danish graduates are appropriate and that labour market matching is good. Having said that, in all the benchmark countries higher education graduates find their first job within approximately three to four months.

The Irish higher education system has been effective in responding to the needs of the labour market, supplying the graduates with a good mix of discipline-specific and employability skills. 75% of Irish employers are satisfied with graduate skills – although this is not the same as fulfilling labour market needs.

Employability of the Dutch higher education graduates is generally good as well. Unemployment rate among highly educated 20-34 year olds is among the lowest in Europe (approx. 2%), and the rate with which Dutch graduates take up high positions[49] is relatively high in comparison with many other countries, which is an indication that the skills levels of Dutch graduates are quite high.[50]

In the case of Switzerland, the growth in student numbers attending higher education has not led to poorer levels of labour market matching. Most university graduates in employment have jobs that require a university degree or are at least appropriate to the professional skills gained in the course of their studies. Also, the general increase in the level of education of the working population has not led to an excessive supply of education which would have eroded the individual's return on this investment.[51] In contrast, demand for knowledge intensive workers (including researchers) is not fully met by the education system, with universities and firms relying on inflows of foreign workers.[52]

3.5 Funding patterns

3.5.1 R&D key figures

GERD as % of GDP in 2012 was highest in Finland, followed by Switzerland, Denmark, the Netherlands and Ireland. With 3.55% of GDP, Finland has one of the highest shares of GERD in the world, only surpassed by South Korea. Among the benchmark countries, the shares of R&D funded by government and by business (% of GDP) are highest in Finland (Figure 8). GBAORD (government budget appropriations or outlays for R&D) as % of total general government expenditure is considerably higher in Switzerland than in the benchmark countries, showing the priority R&D has in government spending. Finland follows second.

All in all, Finland and Switzerland have fairly similar funding structures, with a high share of business R&D spending and a high share of R&D performed by business, a fairly low share of public expenditure (compared to the other benchmark countries) and a high priority of R&D in government spending.

The share of R&D performed by HEIs (% of GDP) is highest in Denmark, while the share of R&D performed by the government sector (in % of GDP) is highest in Finland. In contrast, in Switzerland, Denmark and Ireland, the share of R&D performed by the government sector is very small, implying that most of the public research is performed in the higher education sector (rather than government labs and public research organisations) and that most of public research funding is concentrated there.

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[49] ISCO 1/2 and ISCO 3 level.

[50] CHEPS (2010). Quality of Higher Education in The Netherlands.

[51] Swiss Coordination Centre for Research in Education, Swiss Education Report 2014, Aarau 2014.

[52] Marco Seeber, ERAWATCH Country Reports 2013: Switzerland, JRC Science and Policy Reports, 2014.

GBAORD (government budget appropriations or outlays for R&D) as % of total general government expenditure is considerably higher in Switzerland than in the benchmark countries, showing the priority R&D has in government spending. Finland follows second. All in all, Finland and Switzerland have fairly similar funding structures, with a high share of business R&D spending and a high share of R&D performed by business, a fairly low share of public expenditure (compared to the other benchmark countries) and a high priority of R&D in government spending.

Figure 8 R&D spending, by country, 2012

	Finland	Denmark	Ireland	Netherlands	Switzerland
GERD as % of GDP in 2012	3.55	3.03	1.72	2.16	3.13
Total GBAORD* as a % of total general government expenditure	1.89	1.73	1.09	1.54	2.7
R&D funded by Government (% of GDP)	0.95	0.87	0.51	0.72 (2011)	0.81 (2010)
R&D funded by Business Enterprise Sector (% of GDP)	2.24	1.79	0.84	1.01 (2011)	2.16
R&D performed by HEIs (% of GDP)	0.77	0.95	0.45	0.7	0.88
R&D performed by Government (% of GDP)	0.32	0.07	0.08	0.23	0.02
R&D performed by Business Enterprise Sector (% of GDP)	2.44	1.96	1.2	1.22	2.17

Source: Eurostat. *Government budget appropriations or outlays for R&D

3.5.2 HEI key figures

Figure 9 shows the expenditure on HEIs as a percentage of GDP. In 2011, public expenditure on HEIs (as a % of GDP) was highest in Finland, closely followed by Denmark. In the Netherlands, Switzerland and Ireland public expenditure on HEIs is noticeably lower than in Finland and Denmark. In the Netherlands, private expenditure on HEIs is highest among the benchmark countries.

Figure 9 Expenditure on HEIs as a percentage of GDP, by source of funding and country (2011)

Expenditure on HEIs (as a % of GDP) (2011)	Public	Private	Total
Finland	1.9	0.1	1.9
Denmark	1.8	0.1	1.9
Ireland	1.2	0.3	1.5
Netherlands	1.3	0.5	1.8
Switzerland	1.3	na	na
OECD average	1.1	0.5	1.6

Source: OECD Education at a Glance 2014; na=not available

Expenditure on tertiary education as a percentage of public expenditure is highest in Denmark, primarily reflecting the Danish strategy to increase public expenditure on the HE system. In Switzerland, the share is almost as high as in Denmark, reflecting the (long-standing) commitment to the higher education system in public policy. The share is lowest in Ireland, which was hardest hit by the financial crisis and had to cut public expenditure in the higher education sector by 25% between 2009 and 2014.

Figure 10 Expenditure on tertiary education* as a percentage of public expenditure (2011)

Expenditure on tertiary education as % of public expenditure	**2011**
Finland	3.9
Denmark	4.2
Ireland	2.8
Netherlands	3.5
Switzerland	4.1
OECD average	3.2

Source: OECD Education at a Glance 2014; na=not available; * direct public expenditure on educational institutions plus public subsidies to households1 and other private entities

3.6 HEI funding instruments

Like Finland, the benchmark countries use modern governance instruments to fund and steer their HEIs. Generally they use formula funding and/or performance agreements or a combination of both. Institutional funding is generally allocated in the form of block grants which the HEIs – as autonomous institutions – can spend freely.

The allocation of the block grant is often formula-based. For example, in the Netherlands the block grant size for the universities is made operational in a funding model (*bekostigingsmodel*) that includes indicators for education and research. In Ireland, institutional funding, which is called recurrent grant funding, is allocated based on the type and resource intensity of courses. In Switzerland, having complex funding structures due to the federal nature of the country, some institutional funding streams are also indicator-based. For example, institutional funding allocation to universities of applied sciences is mostly related to the number of students (based on fixed rates agreed nationally), while institutional co-funding from the confederation to cantonal universities is based on a formula which, like in the Netherlands, contains indictors for teaching and research.

Denmark has a different model for the basic research funding for HEIs which is linked to the universities' education funding (the calculation of the university education funding is based on the taximeter scheme). While most of the research funding is distributed in an incremental way, each year 2% of the funding is allocated to a restructuring fund which is redistributed to the universities according to a so-called 45-20-25-10-model. This model was introduced in 2010 and 45% of the funding is distributed according to the universities' education funding, 20% is distributed in accordance with the universities' external research funding (research funding which universities have obtained from the research councils, the EU, etc.), 25% is distributed

in accordance with the universities' publications (bibliometrics) and 10% is distributed in accordance with the number of students having completed their PhD.[53]

With regard to performance agreements, Denmark introduced a new model for development contracts in 2011 as a form of governance that offers the universities greater freedom of action and more flexibility. The contracts are three-year agreements between each university and the Ministry of Higher Education and Science. The aim is to focus on the individual university's goals and results.[54] In the Netherlands, there is a discussion about raising quality and especially differentiation in Dutch higher education. The instrument considered to attain these objectives is output performance contracts. Also in Switzerland, performance agreements are used; the performance contract between the confederation and the ETH Domain (federal institutes of technology in Zurich and Lausanne and four affiliated research institutes) is passed by the federal parliament. Ireland is not using performance agreements yet but is planning to introduce them in the context of basing part of institutional funding on performance linked to strategic goals of the country.

3.7 Internationalisation

The question of internationalisation is taking a more prominent place on the European research and teaching agenda. In this section, internationalisation is looked at through the mobility of students (on the tertiary education level, ISCED 5-6) and scientific personnel as well as internationalisation of the whole research system.

3.7.1 Share of foreign students

As shown in Figure 11, Finland is comparable to the Netherlands in terms of the share of foreign students in the overall student population in the country but this indicator is half of what is being observed in Denmark, Ireland and Switzerland. The supply of educational opportunities and the quality of education is comparable between all these countries, and all countries offer good employment opportunities post-graduation. It is not a question of money either, as education is (mostly) free for EU/EEA citizens, which works as one of the incentives for movement of students. The cost of living is also comparable between Finland and Denmark while it is on average higher in Switzerland. There should be some other factors explaining why Finland is not performing so well in terms of student mobility.

[53] http://ufm.dk/en/education-and-institutions/higher-education/danish-universities/the-universities-in-denmark/economics-of-university-sector/funding-for-research

[54] http://ufm.dk/uddannelse-og-institutioner/videregaende-uddannelse/universiteter/styring-og-ansvar/udviklingskontrakter

Figure 11 Mobility of students, tertiary (ISCED 5-6)

	2009	2010	2011	2012
Foreign students as % of student population in the host country				
Finland	4.25	4.64	5.09	5.71
Denmark	9.62	10.88	11.47	11.74
Ireland	7.08	15.10	11.87	14.38
Netherlands	7.18	7.55	7.36	7.87
Switzerland	21.16	21.68	22.87	23.81
Students going abroad (Outward mobile students as % of student population in country of origin)				
Finland	1.56	1.61	1.74	1.47
Denmark	0.96	0.96	0.94	0.87
Ireland	na	8.92	9.01	8.37
Netherlands	1.10	1.20	1.09	1.19
Switzerland	2.48	2.53	1.98	2.22

Source: Eurostat; na=not available

The geographical location as well as language can be explanations. Ireland is in a position to attract lots of students who are interested in studying in English, whereas Switzerland can attract students, offering as many as three languages (German, Italian and French). The strong stable economic positions of Switzerland and Denmark with good prospects of getting a job upon graduation may also function as a magnet, as well as high quality and strong reputation of their universities.

The booming (prior to the financial crisis) Irish economy as well as favourable immigration policy created good conditions not only for foreign students but also for whole families to move and settle in the country. Close geographical and cultural proximity to the UK encourages many students to undertake their education there. Many legislative reforms in the higher education sector, consistent with the Bologna Process, were carried out in Ireland during the late 1990s. The current Programme for Government contains a number of commitments in relation to higher education – increased internationalisation is one of the top five priorities.

Talent and internationalisation policies are also of concern for the institutions in the Netherlands. In 2008 it was concluded that the Netherlands is one of the few OECD countries that does not benefit from international brain drain.[55] Dutch universities and polytechnics are fully aware of the Bologna agenda, but they are also aware that they are not yet attractive enough to international students and that this should be improved. HEIs have set up cooperation agreements with foreign counterparts and several universities and polytechnics have set up branches abroad (although this does not always go without public debate).

Although the share of foreign students in Finland has gradually increased, its geographical location, its relatively low level of multi-culturalism, its language, less commonly used in Europe, and perhaps the less highly ranked HEIs are additional factors that need to be taken into account when seeking to increase the number of incoming students in Finland.

[55] Nederlands Observatorium van Wetenschap en Technologie, 2008.

3.7.2 Students going abroad

The same pattern is observed in terms of students going abroad. This indicator in Finland is somewhat similar to the Netherlands and Switzerland.

The internationalisation of education and training is high on the political agenda in Denmark. The Danish Globalisation Strategy (presented already a decade ago in 2005) focuses on the means to obtain the government's goal of strong competitiveness and relational power in Denmark, that is to create world class education, strong and innovative research, more entrepreneurs and to promote adaptation and renewal in all parts of the Danish society. The aim is, among other things, to increase access to higher education, creating more PhD positions, stimulating further intensification of the internationalisation of higher education as well as to develop a more effective innovation relationship between universities and the private sector.[56] The internationalisation efforts are being continued. In 2013, the Danish government launched the first part of an action plan to, among other things, increase the number of Danish students going abroad.[57] The universities have also agreed on a code of conduct for offering university programmes to international students. The code of conduct is a supplement to the existing Danish legislation.

Switzerland is moving steadily towards the Bologna target to have at least 20% of the students spending some time studying or gaining work experience abroad by 2020. At the moment it is well achieved by 2nd-cycle university students (28%) but lags behind a little bit among the 1st-cycle students (16%). A rigid structuring of the study programmes was suggested as one possible explanation hindering mobility.

Ireland looks a bit like an outlier in this group of benchmark countries with more than 8% (compared to 1-2% in other four countries) of students going abroad. This can partly be explained by close proximity to the UK (which attracts many young people from Ireland) and the appeal/strengths of research institutions in other English-speaking countries for PhD students.

3.7.3 Internationalisation activities of scientific staff

Looking at some other mobility indicators, such as mobility of scientific staff and international publications (see Figure 12), Finland is not very different from the Netherlands, Denmark or Switzerland (no data have been found for Ireland) in terms of scientific authors (scientific staff with publications) showing no mobility (reporting 88-89%).

[56] Danish University Evaluation 2009 – Evaluation report (2009).

[57] http://ufm.dk/uddannelse-og-institutioner/politiske-indsatsomrader/politiske-indsatser-pa-uddannelsesomradet

Figure 12 Mobility and collaborations of scientists, 2011

	Finland	Denmark	Ireland	Netherlands	Switzerland
Mobility of scientific authors (as a % of authors with two or more publications, by last reported affiliation)					
New inflows	3.3	5.4	na	4.7	10.8
Returnees	7.7	6.9	na	6.5	8.5
Stayers (no mobility)	89.0	87.7	na	88.8	80.7
International collaborations as a % of scientific publications	45.6	51.9	47.62	47.6	51.91

Source OECD STIS 2013

What seems to be slightly different in Finland, however, is the level of new inflows and returnees among the scientific authors. The new inflows stand at 3.3% against 4.7% for the Netherlands, 5.4% for Denmark and 10.8% for Switzerland. The level of returnees (7.7%) is higher than in the Netherlands (6.5%) and Denmark (6.9%) but lower than in Switzerland (8.5%). The latter has the highest share of the whole OECD. This indicates the attractiveness of the Swiss research system for researchers, offering them favourable conditions for research (e.g. availability of funding through the Swiss National Science Foundation) which works both at attracting new people as well as encouraging people to return. It also implies that demand for researchers is not fully met by the national educational system, with universities and firms relying on large inflow of foreign researchers.[58]

Finland is performing similar to Ireland and the Netherlands but less well compared to Denmark and Switzerland in the international collaborations as a percentage of scientific publications. Denmark and Switzerland belong to the group of OECD countries with most international collaborations measured as scientific co-publications.

This indicator points at an international outlook and an international connectedness of scientists in a given country. It is universally acknowledged that world-leading research is without borders and one has to collaborate internationally to break through. All of the benchmark countries show that this is more or less true.

3.8 Research performance

To measure how various countries are positioned against each other in terms of research and innovation a number of indicators can be looked at. Investments in research and development as percentage of GDP has already been discussed in an earlier part of this chapter, with Finland being ahead of the benchmark countries. Patent applications, scientific publications and citations as well as international funding for research (e.g. ERC grants and FP7 projects) are discussed further.

In general, there are different factors explaining patenting activity. First, countries enjoying larger investments into research produce more research results (patents being one outcome of such results). Second, when patents become one of the research results against which the HEIs are being measured, researchers put production of

[58] Marco Seeber, ERAWATCH Country Reports 2013: Switzerland, JRC Science and Policy Reports, 2014.

patents as one of their priorities; hence the number of patents increases. Third, and most importantly, patenting activity differs considerably by research field and industry. For example, research in the medical/pharmaceutical field (which is one of the strongest in Switzerland) results in many patentable inventions while patenting is less important in the software industry.

As shown in Figure 13, Finland is performing better than all benchmark countries but Switzerland in terms of number of patent applications to the European Patent Office. Indeed its performance has been steadily increasing between 2009 and 2012. Number of patent applications from Denmark has been fluctuating; from the Netherlands steadily dropping, and from Ireland, not only dropping but also being at a rather low level. The number of triadic patents families (a series of corresponding patents filed at EPO, USPTO and JPO) shows a somewhat similar picture – Finland is performing better than Denmark and Ireland. The numbers of triadic patent families and patent applications to EPO are rather similar. The big difference in these two types of patents is observed in the case of Switzerland and especially the Netherlands. The number of triadic patent families in the case of the Netherlands is about four times higher than the number of patent applications to EPO. The high number of triadic patents in the Netherlands and Switzerland is primarily due to the large number of multinational companies operating in these countries which are eager to protect their inventions in all the major markets.

Figure 13 Patents, by years

	2009	2010	2011	2012
Patent applications to the European Patent Office (applicants per million of inhabitants)				
Finland	245.36	255.76	261.50	269.61
Denmark	213.50	226.69	223.52	220.33
Ireland	74.45	68.49	66.99	65.52
Netherlands	205.63	181.55	174.50	163.49
Switzerland	401.05	423.69	421.06	424.79
No of triadic patent families (a series of corresponding patents filed at EPO, USPTO and JPO)				
Finland	271	280	277	na
Denmark	224	235	241	na
Ireland	68	63	68	na
Netherlands	824	766	805	na
Switzerland	676	684	678	na

Source: Eurostat; OECD STIS 2013; na=not available

Although widely used as an indicator of research activity and potential for academia-industry collaborations, patents can be somewhat misleading (e.g. they are not very relevant for many research areas) and purely sticking to them as a proxy for good research or third mission success is not advised. Perhaps a better measure of research excellence is competitive international funding, such as grants from the European Research Council (ERC) or through the 7th Framework Programme. Although the ERC has only been in existence since 2007, its grants have become a sign of excellence in research as they strictly fund frontier research.

Figure 14 shows the number of ERC Starting Grants (supporting researchers at the stage of establishing their first research team or programme) and ERC Advanced

Grants (supporting excellent frontier research projects by leading established researchers) for five countries. The Netherlands shows an outstanding success in the acquisition of these grants, closely followed by Switzerland. The ERC grants are mostly awarded to Swiss researchers in the physical sciences and the life sciences, less so in the social sciences and humanities.[59] It is interesting to observe that the two countries swapped their places after year 2010. This is likely to have happened due to the efforts of the Netherlands Organisation for Scientific Research (NWO) – the research council of the Netherlands. It set up a talent scheme – Innovational Research Incentives Scheme (*Vernieuwingsimpuls*) – which offers personal grants to talented, creative researchers with an aim of boosting innovative research and promoting mobility within scientific research institutes. Evaluations of this scheme have been positive and it is argued that the scheme resulted in a substantial number of ERC grants in the country.

Comparing the real number of ERC grants in 29 countries (see Figure 14), Finland has rather low numbers. However, when corrected for population size Finland shows a fair performance – on a par with Denmark and better than Ireland. Switzerland and the Netherlands performed by far the best among the benchmarking countries. Finland ranked fifth (among 29 countries) in the field of life sciences – better than Denmark (6th) and Ireland (15th) but still below Switzerland (1st) and the Netherlands (4th). Finland's performance in physical sciences is also commended; its position is 9th, above Ireland's 11th but below Switzerland's 1st; the Netherlands' 3rd and Denmark's 5th. In the social sciences and humanities Finland came 12th, lower than all the four benchmark countries.[60]

Figure 14 ERC grants, 2007–2013

	Total		ERC Starting Grants		ERC Advanced Grants	
	No of grants	**No of grants per mln capita**	**No of grants**	**No of grants per mln capita**	**No of grants**	**No of grants per mln capita**
Finland	63 (13th)	11.6 (9th)	39 (13th)	7.2 (8th)	24 (13th)	4.4 (10th)
Denmark	73 (12th)	13.1 (6th)	39 (12th)	7.0 (9th)	34 (12th)	6.1 (6th)
Ireland	31 (17th)	6.7 (14th)	23 (14th)	5.0 (10th)	8 (17th)	1.7 (6th)
Netherlands	329 (4th)	19.6 (3rd)	192 (4th)	11.4 (3rd)	137 (5th)	8.2 (3rd)
Switzerland	299 (5th)	37.1 (1st)	147 (5th)	18.3 (1st)	152 (4th)	18.9 (1st)

Source: The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation

In terms of the number of projects and funding received from the 7th Framework Programme, Finland enjoyed a similar success rate as Ireland, Denmark and the Netherlands (see Figure 15) and close in rankings to Denmark in number of participants signed contract and to Ireland in budget share.

[59] Andreas Balthasar, Oliver Bieri, Barbara Good, Beteiligung und Erfolg der schweizerischen Geistes- und Sozialwissenschaften an den Grants des European Research Council. Schlussbericht zuhanden des Schweizerischen Nationalfonds zur Förderung der wissenschaftlichen Forschung SNF, Interface/Technopolis, Luzern und Wien, 5. Dezember 2013.

[60] Appendix B, The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

Figure 15 EU's 7th Framework Programme, 2014

	Finland	Denmark	Ireland	Netherlands	Switzerland
Rank in number of participants signed contract (EU-28)	12	11	15	6	na
Rank in budget share (EU-28)	12	10	13	5	na
Success rate	21.3%	24.2%	22.0%	25.5%	na

Source: http://ec.europa.eu/research/fp7/index_en.cfm?pg=country-profiles; na=not available

However, when looking at the Cooperation programme of FP7 (as it is the largest of the four specific FP7 programmes with 2/3 of the budget), Finland is on the 11th place in terms of success rate (calculated as the number of successful applications in 2007–2013 in relation to the total number of applications from that country), lagging behind the other four benchmark countries.[61] The situation does not change much even when the success rates are calculated as the amount granted in relation to the amount applied for (thus taking into account that research projects may be of very different sizes). Finland comes 12th here, better than Ireland (ranked 13th) but still behind the other three benchmark countries.

Another indicator for research excellence are 'top-cited publications', that is the 10% most cited papers in each scientific field. In 2011, among the benchmark countries, the highest percentage of top-cited publications was found in Switzerland (19.6%).[62] This is the highest rate of high-quality publications among OECD countries but Switzerland is very closely followed by the Netherlands (19.29%) and Denmark (18.76%), testifying to research excellence in these countries. Having said that, Finland (15.45%) and Ireland (14.95%) are not very far behind the three leading benchmark countries.

3.9 University rankings

University rankings is another indicator that is worth looking into as it sheds some light onto the quality of education and research, attractiveness of the HEIs to students and researchers, the potential of the institution as well as the whole national education and research system in a given country.

The Netherlands is one of the few countries of which essentially all its universities can be seen in major rankings. Except for three universities, they all are included among the top 100 in at least one of the major rankings (and two more universities are on place 101 or 102 in at least one of the rankings) (Figure 16).

Five of the twelve Swiss universities are well represented in the international university rankings. This not only concerns the two federal institutes of technology but also cantonal universities. In three rankings (Shanghai ranking, QS Ranking, Times Higher Education Ranking), ETH Zurich is the best ranked university in the whole of continental Europe.

Two of the eight universities in Denmark belong to the top 100 in different university rankings, except in the Times Higher Education Ranking, where none of the Danish universities qualify. In the QS World University Rankings 2014, the University of Copenhagen is ranked in 45th place while Aarhus University is in 96th place. And in the Shanghai Ranking, the University of Copenhagen is ranked in 39th place while the

[61] Figure 2.9 and 2.10, The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[62] OECD Science Technology and Industry Scoreboard 2013; http://www.keepeek.com/Digital-Asset-Management/oecd/science-and-technology/oecd-science-technology-and-industry-scoreboard-2013_sti_scoreboard-2013-en#page136

Technical University of Denmark is in 74th place. As such, the University of Copenhagen is ranked as the best university in Scandinavia by the Shanghai Ranking.[63]

Despite the overall good performance of the Irish higher education system, only one university in Ireland reached the top 100 in university rankings. Trinity College Dublin was listed 71st in the QS ranking in 2014. The Minister for Education and Skills commented that instead of focusing on individual institutional performance, the government needs to think about the performance of the system as a whole.[64] In this regard, the "strategic dialogue" process is viewed as a key instrument in maintaining a national or system focus, rather than an institutional one.

Finland has similar results as Ireland when it comes to the university rankings. Only one university – University of Helsinki – is among top 100 on the Shanghai and QS rankings lists.

Different ranking systems have been widely criticised by academic circles, as they tend to focus too much on specific variables. Most of the rankings stress the weight of research, but some rankings also give substantial weight to education (e.g. QS Ranking), or is based on reputation of the institute (e.g. THE World Reputation Ranking). Nevertheless, university rankings are still being used as one of the outcome indicators measuring the quality of research and while they are in use, rankings should be considered alongside other indicators.

[63] http://www.shanghairanking.com/World-University-Rankings-2013/Denmark.html
[64] Hazelkorn, E. (2013) op.cit.

Figure 16 Rankings of universities, no of universities, 2014

	Top 100 Shanghai	Top 100 QS	Top 100 Times Higher
Finland	University of Helsinki (73)	University of Helsinki (67)	None
Denmark	University of Copenhagen (39) Technical University of Denmark (74)	University of Copenhagen (45) Aarhus University (96)	None
Ireland	None	Trinity College Dublin (71)	None
Netherlands	Utrecht University (57) Leiden University (77) University of Groningen (82) VU University Amsterdam (100)	University of Amsterdam (50) Leiden University (75) Utrecht University (80) Delft University of Technology (86) University of Groningen (90) Erasmus University Rotterdam (90)	Leiden University (64) Delft University of Technology (71) Erasmus University Rotterdam (72) Wageningen University and Research Center (73) University of Amsterdam (77) Utrecht University (79)
Switzerland	ETH Zürich (Swiss Federal Institute of Technology Zurich) (19) University of Zurich (56) University of Geneva (66) University of Basel (90) Swiss Federal Institute of Technology Lausanne (96)	ETH Zürich (Swiss Federal Institute of Technology) (12) Ecole Polytechnique Fédérale de Lausanne (17) University of Zurich (57) University of Geneva (85)	ETH Zürich (Swiss Federal Institute of Technology Zurich) (13) École Polytechnique Fédérale de Lausanne (34) University of Basel (75)

Source: Shanghai ranking; QS Ranking; Times Higher Education Ranking

3.10 Conclusions

What is evident from the benchmark analysis and the respective country reports is that there is not just one factor which can be changed to achieve big transformations in certain established behaviour and/or composition of the HEI sector. It is important to look at the system as a whole, taking into account the HEIs and other organisations in the research sector; private sector composition, performance and contribution; economic, fiscal and political agenda as well as geopolitical and cultural background of the country.

In preparation of the country reports experiences from the four benchmark countries have been collected, and some lessons can be learnt from them. For detailed background information we refer to the country reports.

- All the four benchmark countries have a dual system with universities on the one hand and polytechnics on the other. There are no plans to transfer polytechnics into universities, with the notable exception of Ireland (see below).
- In Switzerland the distinction made between the university sector and the polytechnic sector has been remarkably stable over time, creating distinct profiles of universities and polytechnics. There are possibilities for students to transfer from one type of HEI to the other but in practice they are rarely used. The Netherlands too has created bridges for students to transfer between the two tracks. Also, some universities and polytechnics have joined forces, forming consortia, but so far only one of them has been considered a success. In particular, the main rationale for such consortia – minimising the difficulty to transfer between polytechnics and universities for students – has not been solved in the consortia. In Ireland, mobility of students between the different types of HEIs is facilitated by the use of a National Qualification Framework. In Denmark the polytechnic sector was reorganised in the 2000s. There have been some attempts to facilitate the transfer of students from one track to the other but the two tracks are still fairly separate. Unlike in the Netherlands, Switzerland and Ireland, a bachelor degree from a University College in Denmark does not entitle holders to do a master's programme at a Danish university.
- As the Irish case shows, in performing the transition of the polytechnics into universities (if this is on the agenda), it needs to be ensured that the new entities are going to reach the level of research required of universities (i.e. number of skill based staff and quality of outputs) and at the same time maintain their specific focus (i.e. not to lose trained students).
- Keeping the regional coverage as well as employability of graduates is paramount in achieving the success of the above-mentioned transition.
- Simplistic solutions (e.g. just changing the names of the institutions from a polytechnic to a university) should be avoided. It is not about the name or formal status change but about changes in the internal structures, missions and processes.
- Restructuring of the system (i.e. mergers between universities or universities and research institutes etc.) following a very clear long-term strategy creates a more concentrated system, as has been shown in Denmark, the Netherlands and Switzerland. Through mergers resources for higher education and research can be concentrated to a more limited number of actors.
- Although the Netherlands has to lowest number of HEIs per number of students among the benchmark countries, it is generally believed that there are still too many HEIs in the Dutch system. There are discussions among universities and polytechnics about mergers. Given the higher number of HEIs this lesson should perhaps be taken to heart.
- Both in the Netherlands and Switzerland, the mergers of individual tertiary level schools taking place in the 1980s and 1990s, have led to polytechnics that have several locations or spokes. Multi-location polytechnics may be a role model for Finland that may do justice to the geographical circumstances of the country.
- In the Netherlands, recent mergers of polytechnics have resulted in economies of scale that allow at least five of them to start experimenting with strengthening applied and practice-oriented research programmes.
- While introducing and implementing changes to the system it is crucial to maintain clarity in the policy and communicate it properly to the whole higher education and research system.
- Internationalisation of the higher education and research system is crucial but needs to be seen in a geographical context, as the Irish and the Swiss case show.

Nevertheless, certain conditions (for example, structures and mission of HEIs to promote internationalisation, acknowledgement of the importance of internationalisation on a national policy level etc.) need to be created on a system level as well as within individual institutions to encourage and support international mobility and internationalisation of research.

- Continuity and robustness of the higher education funding and policy making with long-term principles focusing more on framework conditions than on policy interventions bring sustainable results, as the Swiss case shows.
- Collaboration between various players in the higher education system needs to be fostered. This could be done either in regional clusters or, perhaps, in the fields, e.g. medicine, – something that is being currently debated in Ireland. This has to be seen against the backdrop of dramatically reduced availability of funding in the Irish higher education system and, as a consequence, concerns about quality. Collaborations are thought to enhance quality of outcomes and scale. 'Clusterisation' of the HEIs should allow sharing academic planning; access between higher and further education; and enterprise engagement.

We end this chapter with a summarising matrix of each benchmark country's and Finland's strengths and weaknesses (Figure 17). As can be seen, in all the countries the strengths outnumber the weaknesses, which is not surprising as all the countries we have chosen for benchmark as well as Finland are well-performing systems.

Figure 17 Strengths and weaknesses of the four benchmark countries and Finland

Denmark	
Strengths	Weaknesses
• There has been a broad commitment to allocation of resources and structural changes of the university system • A stable funding model has been established and there have been large investments in public and private research and development over time • Through mergers resources for higher education and research has been concentrated to a more limited number of universities and public research institutes • Strong academic leadership with focus on academic excellence in establishing creative environments • A strengthening of practice-oriented higher education by the establishment of University Colleges and Academies of Professional Higher Education • Actions such as a new innovation strategy in 2012 have been taken by the Danish government to strengthen knowledge and technology transfer between public research and the surrounding society • Very productive researchers when measured by number of scientific publications in relation to the size of the population. Similarly, Danish research has great impact in terms of citations per publication • A high degree of international collaboration with 60 per cent of publications co-authored with at least one researcher from another country • Denmark is successful in attracting EU funds	• Further improvements of quality and relevance in higher education is needed to be able to reach the goals of the Danish Government • The share of innovative firms in Denmark is below the average compared to the other European OECD countries • Commercialisation of research results from public research institutions could be improved

Ireland	
Strengths	Weaknesses
• Share of graduates from secondary level education is high – it produces good quality input to the third level education • Large number of students is educated in HEIs • HE is valued in Irish society – higher education helps to get a better job and salary • Labour market needs are well met – employers are happy with graduate skills • The HE system was well funded until about 2009–2010 • The regional coverage offered by the Institutes of Technology is good • Different skills are offered via the Institutes of Technology (applied education) and universities (academic education) • There is a certain element of consistency in a system which is small and where leaders of all HEIs know each other • It is a system of relatively low tuition fees for undergraduates but punishing those who do not progress	• Underinvestment in the last five years has most likely resulted in lower quality of graduates, poorer research results and increased needs in infrastructure (due to data lag, the statistics do not yet show this situation) • High percentage of people study in the third level education system. Reasons behind such results are not clear. Is it because people are interested? Or because the system is pushing them to study in order not to be on unemployment benefits? • There is a gap between the skills taught by the universities and Institutes of Technology • Due to lack of funding, the Institutes of Technology want to become universities to get access to research funding. However, they do not have the staff or skills for such a change at the moment
The Netherlands	
Strengths	Weaknesses
• Universities and polytechnics are generally considered to be of good quality, also in an international context. For universities that goes for both education and research. • The Netherlands is successful in attracting EU funds (especially H2020 funds in coordinator roles and ERC grants) • Research in the Netherlands is considered very productive and cost-efficient. • Like in some other benchmark countries, there is a stable funding model for both universities and polytechnics. This offers them long-term perspective. • Mergers of polytechnics have resulted in economies of scale that allow at least five of them to start experimenting with strengthening applied and practice-oriented research programmes. • HE in The Netherlands has succeeded in adopting a steeply increasing number of students over the past decade in a very cost-efficient manner. • The regional coverage of polytechnics, and to a lesser extent universities, is good • Dual system of universities and polytechnics with clear and stable profiles, accepted by most stakeholders • Increased focus on science industry linkages in the few decades.	• Funding has not been able to keep up the paste of student numbers growth, and of growth in general, in the past decade and a half. Polytechnics and universities increasingly sound the alarm bells. • Funding issues especially hit the domains that find it harder to align with direct RoI, such as the humanities. Many of them are also faced with decreasing student numbers, which is the main parameter for block funding. Universities find it hard to realise sustainable environments for these domains. • The university system in The Netherlands is relatively rigid. Institutional punctuations have not been witnessed since the early '80s. Yet, there is an increasing understanding –also by the universities themselves - that there will be a need for this in the upcoming years. • Unemployment rates among university and polytechnic graduates have increased rapidly over the past few years.

Switzerland	
Strengths	Weaknesses
• Prioritisation of education, research and innovation by the federal government. However, given the decentralised nature of the Swiss HE system, priorities and strategies do not play as large a role as in less decentralised countries. • More importantly, strong position of research, innovation and education policies which benefit from wide, nonpartisan political support • Continuity in funding, both at federal and cantonal levels, with a focus on excellence. Stability of funding despite complex funding structures. • Concentration of funding in a few (comparatively small) universities, tiny government research sector. • Better alignment of funding and better coordination of the various actors through currently ongoing reform. • Dual system of universities and universities of applied sciences with clear and stable profiles, accepted by all stakeholders • The establishment of universities of applied sciences in the 1990s merged existing tertiary level schools, reducing the fragmentation of tertiary education • High employability of graduates, irrespective of the type of HEI they attended • Clear division of labour between the private und the public sector, with the public sector focusing mainly on the funding of education and basic research, and the private sector funding applied research and experimental development. • High share of GERD funded by industry and high level of patenting activity, mainly due to existence of large global companies • Highly performing, attractive, open research system, with very productive researchers when measured by number of scientific publications in relation to the size of the population. Similarly, Swiss research has great impact in terms of citations per publication • A high degree of international collaboration with 60 per cent of publications co-authored with at least one researcher from another country. • Switzerland is very successful in attracting EU funding, including ERC grants • Increased focus on science industry linkages in the few decades. Co-publications with industry 80% percentage points higher than EU average. • Efficient HE system. Public expenditure on R&D very high in absolute terms and above EU-27 average in % of GDP but not hugely so. Very good results given the amount of money invested.	• Complex institutional and funding structures but to be better coordinated and aligned through major reform • Some weakness can be identified in the capability of the educational system to meet the demand of highly skilled workers. • Therefore, high reliance on influx of foreign researchers (and skilled workers more generally), endangered by recent political developments • Uneven career structure models across universities

Finland	
Strengths	Weaknesses
• Several important reforms have already been made, including an autonomy reform and new acts for universities and for UAS • An important step towards a more transparent funding stream for UAS has been taken with the recent reform for UAS • Strengthened academic leadership through the reforms • Increased connection to the surrounding society through inclusion of external members of the HEI boards • A few mergers between HEIs have contributed to slightly fewer HEIs • The merger that resulted in the establishment of Aalto University has received significant attention internationally and is generally seen as a success • Well-developed innovation system; an innovation leader according to Innovation Union scoreboard • High performance of the schooling system; highly raked in international tests • Strong connection between UAS and regional business • The regional coverage of UAS, and to a lesser extent universities, is good	• Few internationally top-ranked HEIs • Existence of barriers towards transfer across the dual system for students • Low level of foreign recruitment of academic staff at HEIs • Scattered HEI landscape with comparatively many HEIs, some of which are quite small • Small subjects exist at many HEIs • Low level of internationalisation in the system as a whole • Underdeveloped level of cooperation between universities and UAS • Legal barriers towards deeper cooperation and mergers between universities and UAS • The innovation system does not contribute sufficiently to commercialisation of knowledge and creation of new jobs • Long study times

4. Voices from within: priorities and concerns at universities and UAS

In this chapter, the results from a survey to the universities and the UAS as well as selected results from the interviews are presented. The findings from the survey to the universities are presented first followed by the findings related to the survey to UAS. Interview results complement the survey presentations. In the third and last section of the chapter, additional results from the interviews are shown.

4.1 Survey results for universities

4.1.1 Descriptive statistics

For the survey 14 universities were invited to participate. Out of these 14 universities nine universities provided us with answers to most of the questions. We do not know the details regarding how the respective universities have responded; i.e. we have no information as to whether they have involved different staff or students in the responses. However, it is likely that in most cases the survey has been filled out by a few individuals in the management of the institution. Overall this is a very small sample size for any given analysis, as a single institution has a lot of impact on a simple calculation like the average. Therefore it is important to understand that this chapter provides an overview of the universities and UAS but is far from a statistical analysis. Please note that every figure will include a reference to the sample size in the following way: *(N=number)*.

Four out of these nine respondents were from universities that were merged after 2008. These participants were requested to skip questions that concerned the situation in 2008. If for some reason the merged universities did provide answers about their situation in 2008 these answers were not used in the analysis. The main reason for not incorporating these answers is that the comparison between the current situation and in 2008 is based on different institutions, namely merged and non-merged.

One university responded to the survey that is used for the UAS.[65] The most obvious explanation would be that the responsible person at this university was given access to the UAS survey through a colleague or friend at a UAS. For this university steps were taken to transfer its data to the university survey template. As most questions are similar, the coverage of questions is quite high. However, some questions presented different options for universities and UAS to choose from, and for these questions this university's answers could not be used.

4.1.2 Internal funding policies

In the survey, the universities were asked to provide insight into their internal funding allocation policy. The universities provided a percentage-wise distribution over a set of allocation strategies. This question was asked four times, twice on the topic of education for their situation in 2008 and 2014 and twice on the topic of research, also for 2008 and 2014. The set of allocation strategies presented to the universities was different for the questions regarding education and research.

There are a few universities that merged after 2008. For these universities no answers could be collected for the situation in 2008. Furthermore there were four participating universities that did not provide us with any distributions, as in some cases funding is not allocated separately to education and research or a reference was made to a distribution model without being explicit on the mechanisms of the model. So in the

[65] All communication was checked and this university only received invitation for the university survey.

end only five universities provided us with a clear distribution of which only three universities were not merged after 2008.

Although in this case there are only a few responses to base any conclusions on, it still provides valuable insight into the allocation policy of these universities. It is of course important not to generalise.

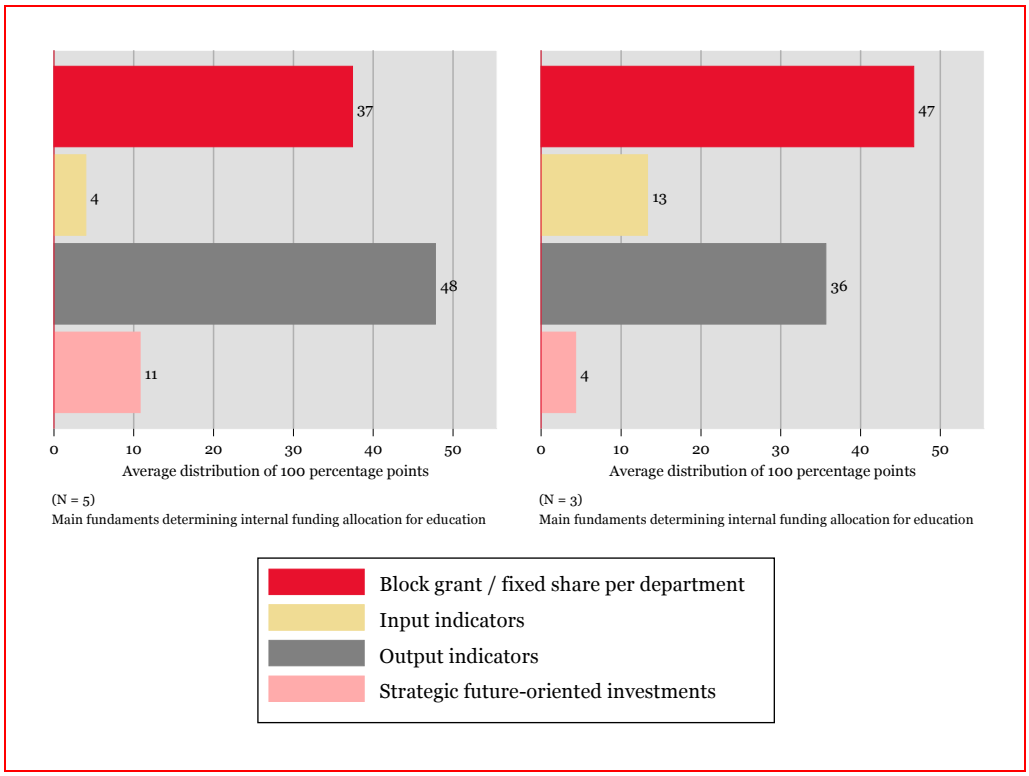
4.1.2.1 Education

In terms of internal funding allocation for education the following set of allocation strategies was presented to the survey participants:

1. Block grants / fixed share per department
2. Input indicators (influx / number of students)
3. Output indicators (graduates, grade levels)
4. Strategic future-oriented investments
5. Other, namely … (Participants were able to provide an open answer)

For this question all answers in the "other" category were redistributed amongst the other categories as they had a good fit. The end results show that "Block grants" and "Output indicators" are on average the most important as can be seen on the left in Figure 18. The results show no clear dominant allocation strategy is present. There is only one university that actually bases its allocation strategy half on block grants and half on output indicators, while some other universities base their allocation (almost) entirely on either block grants or output indicators. For the situation in 2008 the allocation strategies are very similar, as can be seen on the right in Figure 18. The small differences are due to the small and different sample size, as two of the five institutions that provided input on their internal funding allocation were merged after 2008.

Figure 18 Average percentage-wise distribution for internal funding allocation of resources in education for universities for current situation (left) and for 2008 (right).



Source: Technopolis 2015

4.1.2.2 Research

In terms of internal funding allocation for research the following set of allocation strategies was presented to the survey participants:

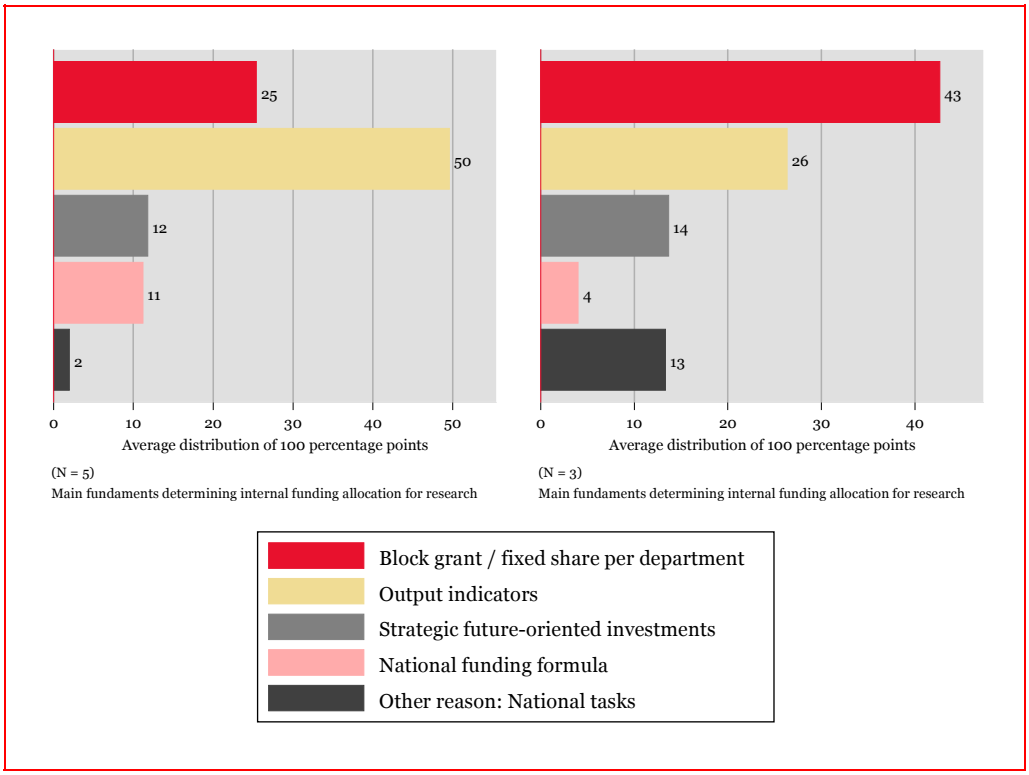
1. Block grants / fixed share per department
2. Output indicators (publications, citations, number of PhDs, success in attracting competitive funding)
3. Strategic future-oriented investments
4. National funding formula
5. Other, namely … *(Participants were able to provide an open answer)*

The answers to the survey show that "Block grants" and "Output indicators" are on average the most important in resource allocation for research as can be viewed on the left in Figure 19. These results do not differ that much from the resource allocation for education. In a similar fashion we also see the same pattern in which only one university actually bases its allocation strategy half on block grants and half on output indicators, while some other universities base their allocation (almost) entirely on either block grants or output indicators. Although no clear dominant allocation strategy is present for research, it becomes clear that: 1) universities base their resource allocation for research and education on the same mechanisms; or 2) universities do not allocate resources separately for education and research.

Due to mergers there are only three survey results for the situation in 2008. These three universities indicated that "Block grants" and "Output indicators" were also the

most important in 2008, however we do see a slightly different picture on the right in Figure 19 when comparing to the current situation. The main reason for this is that we have less data, making the graphs more dependent on these few participants. When comparing the current situation to 2008 for individual responses, the biggest change we see is for one institution that used to base its resource allocation partially on input indicators in 2008, hence the higher score in the "other" category in Figure 19.

Figure 19 Average percentage-wise distribution for internal funding allocation of resources in research for universities currently (left) and for 2008 (right).



Source: Technopolis 2015

4.1.3 Funding sources

The respondents were asked to provide insight in their funding sources. Compared to 2008, three out of five universities are able to access more external funding, of which one showed a significant increase. Similarly, three out of five universities were able to diversify the sources of external funding in the past six years. However, almost all universities have strategically resourced support services for external funding activities. These services mostly support research funding and to some extent grant application.

The respondents were furthermore asked to indicate whether the institution has internal funding schemes for various competitive grants and salary bonuses. Figure 20 shows the results. Most universities (six out of nine) have an internal funding scheme for research grants while only four out of the nine have an internal funding scheme for education grants. Respectively, four and three universities indicated to have an internal funding scheme for performance based research salary and for performance based education salary bonuses. So overall there are more competitive internal funding schemes for research than for education.

Figure 20 The number of universities (out of nine) with research and education internal funding schemes

Internal funding schemes	Number of universities (n=9)
Internal (competitive) research grants	6
Internal (competitive) education grants	4
Performance based research salary bonus	4
Performance based education salary bonus	3

Source: Technopolis 2015

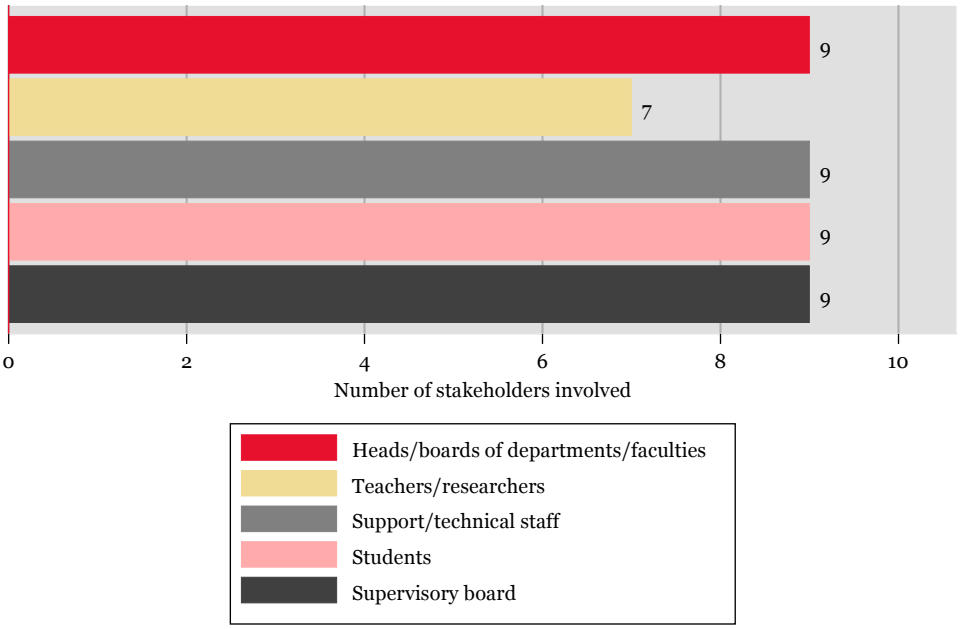
Almost all universities have centralised funds available for new strategic opportunities. The average amount for these funds is €12.5M (4.8% of total budget). The lowest amount for these funds is €0.5M (1% of total budget). The highest amount for these funds is €78M (12% of total budget).

4.1.4 Strategy of the institution – involvement of stakeholders

On the topic of strategy development, the universities were asked to indicate which internal and external stakeholders were involved in the strategy development. As Figure 21 shows, regarding internal stakeholders, all universities indicated that the heads/board of departments/faculties, support/technical staff, students and the supervisory board were involved in the strategy development. Seven out of the nine universities indicated that teachers and researchers were also involved. One university indicated that there was also another internal stakeholder involved, namely alumni.

Figure 22 shows the types of external stakeholders involved in the strategy development of universities. Almost all universities indicated to involve private partners. Seven out of the nine universities involve public partners and the municipality/regional partners. Five universities involve societal organisations and four involve the government. It is noteworthy that one university emphasised the importance of the international academic community as an external stakeholder.

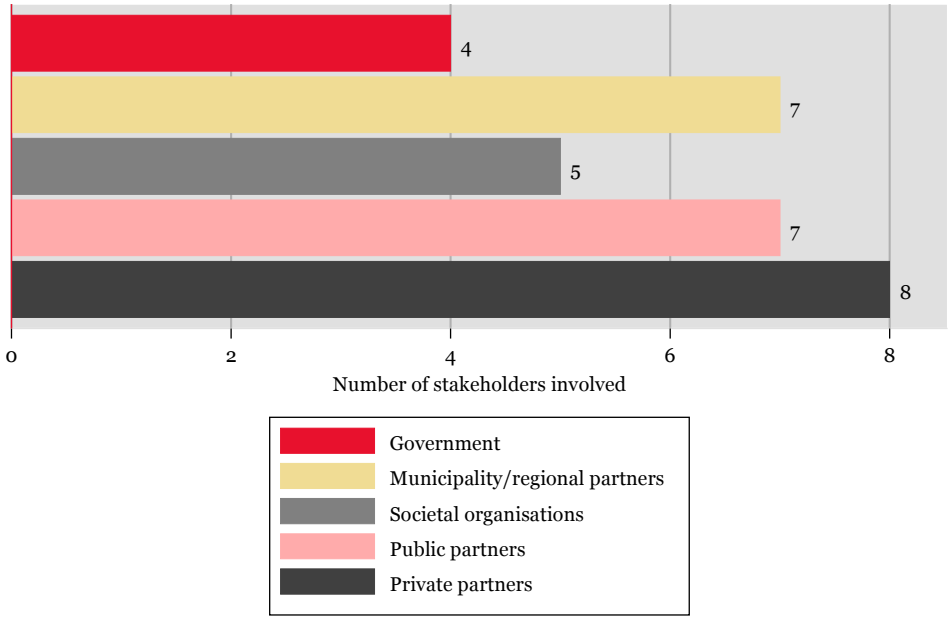
Figure 21 Internal stakeholders involved in strategy development



(N = 9)
Q: Involvement of internal stakeholders in the internal process of strategy development

Source: Technopolis 2015

Figure 22 External stakeholders involved in strategy development



(N = 9)
Q: Involvement of external stakeholders in the internal process of strategy development

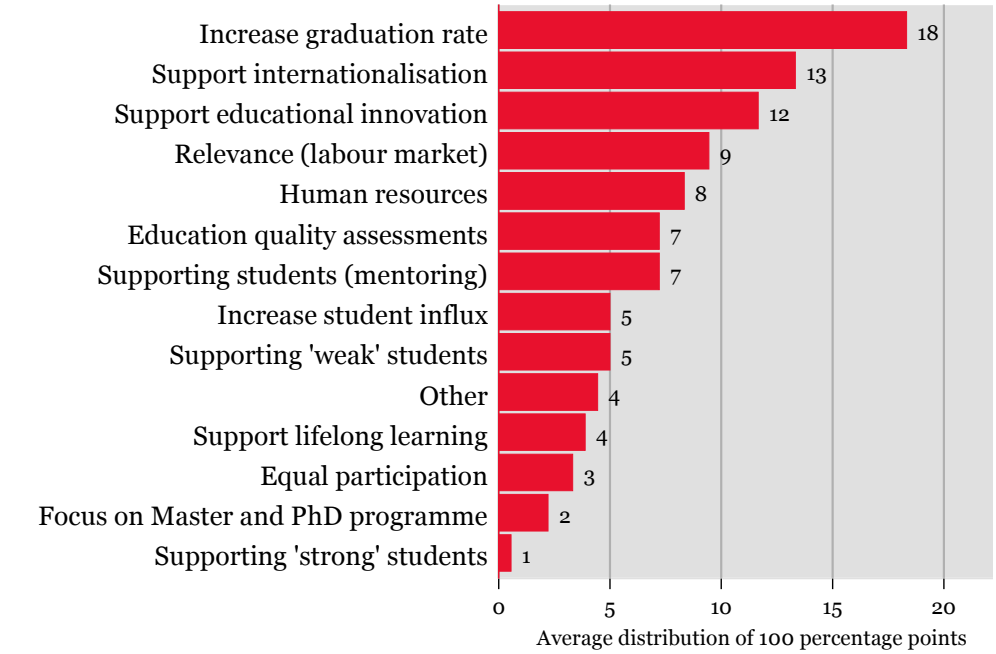
Source: Technopolis 2015

4.1.5 Policy and strategy for education

The universities were asked to give insight into what elements are considered in educational policy development. From a list of thirteen elements, the universities were asked to indicate which elements are used in educational policy development. Furthermore the universities were asked to simultaneously provide insight in how important these elements are in the development of educational policy by distributing 100 percentage points over these elements. In addition, the universities were given the option to include other elements.

On average the respondents selected eight of the thirteen elements as having importance. Figure 23 shows the average results. The most important element is the increase in graduation rate, followed by support for internationalisation and education innovation. Almost none of the universities indicated that equal participation, support of lifelong learning, the support of strong students and a focus on Master and PhD programmes are important in their educational strategy development. Some universities noted that other elements outside of the provided list were important. These elements consist of the development of a new PhD programme, students' well-being, and mobility of students. When comparing the higher scoring elements to the lower scoring elements it becomes clear that the universities are focusing strongly on the essentials of their education processes, i.e. securing good graduation rates, education innovation, human resources and quality assurance. Also internationalisation is a relevant topic. There seems to be less focus on more strategic issues (i.e. lifelong learning, equal participation) and excellence (i.e. supporting strong students).

Figure 23 Elements in order of important for educational policy



(N = 9)
Q: Percentage-wise distribution of importance for educational policy

Source: Technopolis 2015

The universities provided insight into their best practices on the above rated educational policy elements. The universities provided diverse examples, however some best practices had common elements. Best practices concerning internationalisation include compulsory studies or internships abroad, double-degree international MSc programmes and overall support for international exchange. Several universities emphasised that student progress/success is ensured by monitoring and support provided by teachers and tutors. Furthermore some universities indicated having a platform where staff receive training in academic teaching.

The results are backed up by the findings in the interviews with university representatives. For instance, the top rated element 'Increase graduate rate' is reflected in the following answer by a university rector when asked what the largest concern was with respect to the higher education system:

> *One problem is students who study for a very long time or leave the universities without a degree. There must be better and more inspiring teaching at the universities and a good connection with working life. Employers should not employ people without a degree, which has often been the case.*

This rector is not alone in his opinion; many interview respondents mentioning the same issue. Another university rector says:

> *Measures must be taken to shorten the time for the students at universities. One way to put pressure on students is to make them pay for the time they overrun the normal time for the course of studies.*

4.1.6 Policy and strategy for research

The universities were asked to give insight into what elements are considered in the development of the research policy. The universities were provided with a list of eleven elements and asked to distribute 100 points over these elements indicating their importance in the strategy development. In addition, the universities were given the option to provide other elements. On average the respondents selected 8.5 of the eleven elements as having importance. Figure 24 shows the results. The most important element is the training, promotion and hiring of research staff (human resources), followed by PhD training / graduate schools and support for internationalisation. None of the universities take development of collaboration with societal organisations into account, although there is a certain alignment with the grand societal challenges. Furthermore, one university indicated an element outside of the provided list into account, namely the profiling of research.

As with education, we see a focus on the essentials in research. Therefore we see high scores for research staff, research groups, quality assessments and grants/investments, while we see far less focus on strategic elements like profiling, societal issues and new research fields.

Figure 24 Elements in order of important for research policy

(N = 8)

Q: Percentage-wise distribution of importance for RDI policy

Source: Technopolis 2015

The universities were asked to provide best practices on the above rated research policy elements. The respondents provided diverse examples, however with some common elements. Several universities indicated that their departments for human resources support international recruitment and mobility of staff. Also international activities such as joint programmes and international collaboration are supported. Furthermore the development of a tenure-track system and (PhD) training are also mentioned.

The interviews provide some deepened insight into the rated elements in Figure 24. The concerns regarding human resources – staff and students – and internationalisation often becomes intertwined. Three quotations by three top university management representatives (from different universities) are shown below to reflect this:

> *We need more international students at the HEIs. And also staff.*
>
> *Internationalisation is very important in the future. There is a need for more foreign students and researchers at Finnish universities. They need influence from other countries, and additionally, more teaching in English.*
>
> *We need more international recruitments and contacts. We need the best ones, simply. It is a necessity. This will mean more internationalised universities. In theory the system is reacting to this, in practice, no. We are in danger of falling to the margins of science. Nobody knows us. If we are not actively participating we are not seen. We are not on the radar of the others.*

4.1.7 Policy and strategy for utilisation

Similar as for education and research the universities were asked to give insight into what elements are considered in the development of the utilisation policy. The universities were provided with a list of thirteen elements and were again asked to distribute 100 points over these elements indicating their importance in the strategy development.

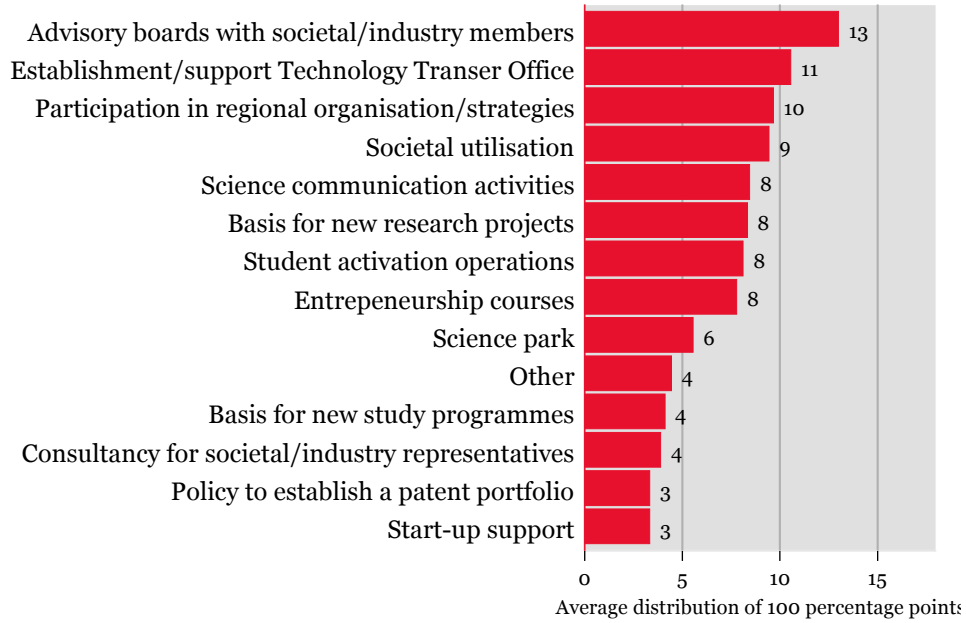
On average the universities selected nine of the thirteen elements as having importance. Figure 25 shows the results. The most important elements are the advisory board with societal and industry members, the support of a technology transfer office and participation in regional organisations/strategies. Also in the interviews, positive opinions have been expressed regarding the external members of university boards. One university rector says:

> *The new boards are good and they give the universities important external expertise.*

Few of the utilisation policies of the universities involve start-up support, establishment of a patent portfolio or consultancy for societal/industry representatives. Some universities indicated that other elements were important. These elements consist of the development of new adult/executive education and alumni activities.

Hence we can see that the focus of their utilisation elements is on transferring the research results and topic expertise but to a lesser extent on practically using the results to build up businesses and/or services. The top elements are therefore advisory boards, transfer offices, participation and communication whereas the bottom is filled up by start-up support, patents, consultancy and new forms of education.

Figure 25 Elements in order of important for utilisation policy



(N = 9)
Q: Percentage-wise distribution of importance for utilisation policy

Source: Technopolis 2015

The respondents provided diverse examples of best practices on the above rated utilisation policy elements, but also common elements were mentioned. Several universities mentioned support to entrepreneurship and commercialisation of ideas. For example, the University of Helsinki has set up Principles of Commercialisation and has its own company for commercialisation of research ideas; the University of Turku funds investigation of potential new businesses for specific innovation from the Tekes programme 'Tutli'. Other universities also mentioned support to entrepreneurship, guidelines for spin-offs and facilitation of collaboration between students and companies. Start-up support and patents do not have a big role in the development of utilisation policies.

Another best practice that is mentioned by more than one university is the relationship with stakeholders; some universities indicated that there is a strong representation of external stakeholders in the administrative bodies and in regional cooperation.

4.1.8 Policy reforms for universities

The universities were asked how they assess the university reform and the new Universities Act that took effect in the beginning of 2010. All universities were (very) positive about these reforms. The universities were then asked to indicate which two elements were the most important out of a list of five reform elements. Figure 26 shows the results.

The most important element is the increase in autonomy for the management of HEIs. The universities were also asked to indicate whether even more autonomy than granted in the reform of 2010 is needed to increase the institution's performance. Four out of eight responding universities believe that more autonomy is needed. These respondents indicate that more autonomy is needed for financial management, education provision/curriculum/study programme and quality assurance. In addition one university indicated that the restrictions on educational export should be eased and another university indicated that more autonomy is needed concerning the tuition fees for students from outside the EU.

Furthermore none of the universities indicated that reorganisation of the PhD education was of importance.

Figure 26 The most important changes in the reform of 2010

Most important changes	Votes
More autonomy for management at HEIs	6
HEIs become independent legal entities	4
More financial autonomy	3
HEIs become employers	1
University level reorganisation of PhD education to enhance systematic provision	0

Source: Technopolis 2015

4.1.9 Strengths, improvements, challenges and threats

The universities were asked to indicate what their most important strengths, improvement areas, challenges and bottlenecks are. As these were open-ended questions, diverse responds were given. The following elements were mentioned more than once:

- Strengths

  Several universities mentioned that staff is one of their strengths due to their creativity, competence and motivation. Moreover, a strong research culture and the quality of research are mentioned. Furthermore the multidisciplinary character of universities was mentioned more than once. Some universities indicated that innovation of education such as a new learning environment is their strong suit. Several universities indicated having a strong and stable financial position.

- Improvements areas

  A majority of the universities responded that internationalisation is an area where they can improve, especially the recruitment of international staff. As already noted, this issue comes back again and again in the study. Some said that internationalisation should be integrated in all operations. Several universities indicated that they could improve in gaining external funding. Some specified that this includes the development of acquisition of research funding, international funding and the funding from Tekes and the EU. Furthermore, some respondents answered that there is room for improvement in research, especially in research profiling and in their publishing productivity. Finally some respondents considered education as an area for improvement, especially concerning the influx of talented students and the reduction of graduation time.

- Challenges

  The main challenge for universities is the increasing competition for international students, staff and research funding. This includes the challenge to secure infrastructure funding to make up for the decline in state funding for infrastructures, equipment and facilities.

- Bottlenecks

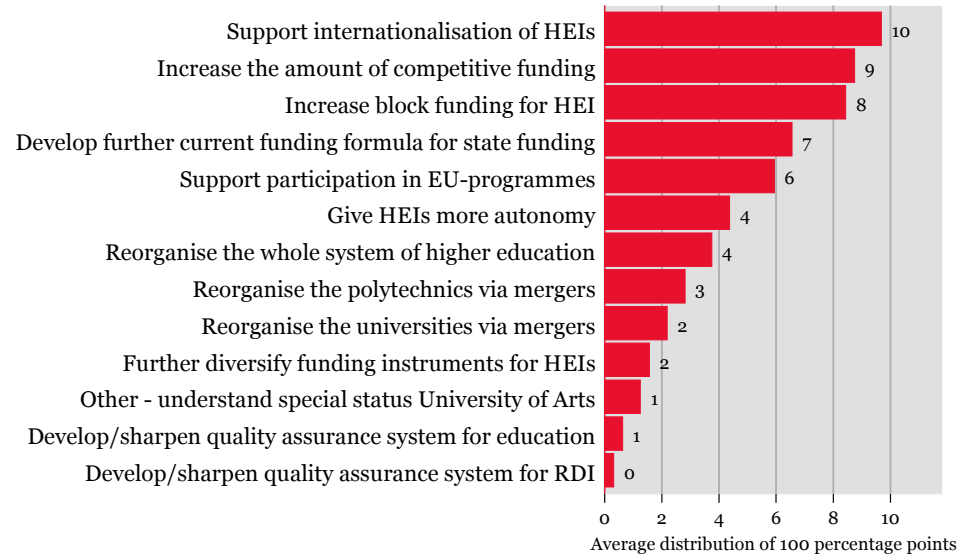
  The main bottlenecks mentioned are diverse. Some universities mentioned that there are organisational barriers such as a non-crystallised strategy, lack of shared organisational culture and a fragmented organisational structure. Furthermore some respondents indicated that increasing facility costs and modern research infrastructures are bottlenecks. One university indicated that trade union policies (e.g. summer holidays and teaching material copyright) and governmental policies (e.g. restricted intake and international restrictions) are barriers. Finally the unattractiveness of Finland in recruitment is also mentioned.

4.1.10 Support from Finnish educational policy

The universities were asked to give insight into what elements of national Finnish educational policy would help them the most. The universities were provided with a list of twelve elements and were asked to distribute 100 points over these elements indicating which elements would help them the most. Figure 27 shows the results.

The universities indicated that the following elements are the most important: Increase block funding for HEI, increase the amount of competitive funding and support internationalisation of HEIs. Almost none of the universities indicated that policy on quality assurance and reorganisation/mergers are important.

Figure 27 Importance of policy elements



Source: Technopolis 2015

4.1.11 Future needs and trends

The universities were asked several statements concerning the overall structure of the HEIs. The first statement concerned the dual system of universities and UAS. Five out of nine universities would like the dual system to be replaced. The universities were also asked to indicate whether they believe that 14 universities and 24 UAS is the desired number for Finland. Concerning the statement of 14 universities being the desired number, the universities gave diverse and indecisive answers; most respondents chose either 'somewhat agree' or 'somewhat disagree'. Five universities are on the disagreeing side and four on the agreeing side. In some contrast, most universities disagree that 24 UAS is the desired number for Finland.

Furthermore the universities were asked to provide their opinions about a long list of statements. For each statement they were asked to rate its importance and whether they agreed or disagreed with the statement. In Figure 28 all statements and the average reactions to the statements are listed. The left column shows the broad importance categories, so the list of statements is ranked due to their importance even within the broad importance categories. To give an example, this means that the five most important statements are the five statements that are highest in the figure.

The first thing to note is that on average none of the statements were found to be unimportant as all statements were ranked as at least moderately important. Furthermore it is notable that for the most important statement ("Research quality at Finnish HEIs is generally high") the answers in terms of agreement were very diverse. This means that some universities believe that the research quality at Finnish HEIs is high while others believe it is not (see also the paragraph about the strengths). When looking at the second, third and fourth most important statement, most universities believe that 1) recruitment of staff will become most important in the future; 2) student-centred learning methods should be fully implemented; and 3) distinct profiling and branding of HEIs become more important. Notable is that the universities also somewhat agree that HEIs should be able to grant both academic and professionally oriented HE degrees – indicating that the dual model needs to be

reformed or potentially replaced. Consequently, some answers to different questions are in part contradictory.

The need for more than one internationally top-ranked university is only found to be moderately important. In a similar fashion the universities do not value the statement about the impact of collaboration with industry on research quality very highly.

Figure 28 Average agreement to statements about higher education, ranked on average importance (also ranked within categories of importance). (N=9)

Average Importance	**Statement**	**Average Agreement**
Very Important	Research quality at Finnish HEIs is generally high	Somewhat agree
	Recruitment of the staff will become the most important future investment for HEIs	Agree
Important	Student-centred (i.e. blended learning, flipped classroom) learning methods should be fully implemented	Agree
	Distinct profiling and branding of HEIs become more important	Agree
	A HEI should be able to grant both academic and professionally oriented HE degrees	Somewhat agree
	Interdisciplinarity will become more important in both research and education	Agree
	The grand challenges and societal needs must have a greater influence on which research is being supported	Agree
	There are sufficient structures in Finland for utilisation of research findings	Somewhat disagree
	Universities of applied sciences should have a regional focus rather than national or international	Fully agree
	Student selection will become the most important future investment for HEIs	Agree
	The grand challenges and societal needs must have a greater influence on the educational content	Agree
	There will be more online courses and less students on campus	Somewhat agree
	Foreign students from outside EU need to pay tuition fees	Somewhat agree
	Collaboration with industry will become more important than basic research	Somewhat agree
	All the students need to pay tuition fees	Disagree
Moderately important	Finland needs more than one internationally top-ranked university, even if means to re-allocate national resources from weaker to stronger HEIs	Agree
	Collaboration with industry raises the quality of research at	Somewhat agree

Average Importance	Statement	Average Agreement
	HEIs	
	Export of services of HEIs becomes more important	Somewhat agree
	Better regional embedding is essential for all HEIs	Somewhat disagree

Source: Technopolis 2015

The interview results complement and typically support the survey findings. There are different views on whether the dual model should be altered or not, and there are different views regarding the quality of Finnish HEIs, to mention a few highly prioritised issues. The number of HEIs in the system is also repeatedly touched upon in the interviews.

Most interview respondents would like to see some changes in the dual model, but while some want to keep it, others want to alter it.

> *Now we are losing resources due to the dual system, so a new model is needed.*

> *The dual model is not functioning as it should.*

While the support for mergers ranked rather low, as shown in Figure 27 for instance, the views are proven to be more complex in the interviews. One reason for the negative view is presented by this interviewee:

> *When it comes to the university mergers, putting things together looks good on paper, but it is important to analyse the content instead of just putting universities together. The universities got a lot of money without a plan. The mergers were not done in a good way.*

Others are less focused to the processes and more to the outcomes; why are the mergers undertaken, what reason is behind them and what is anticipated to be achieved? One rector remarks:

> *Far too fragmented and scattered system, too many HEIs and institutes. Maybe more mergers are needed. But some smaller units would most likely need to be closed down.*

Perhaps trying to avoid a yes or no when it comes to mergers, one other interviewee sums up:

> *Could we look at the universities and the UAS and institutes, look at the whole picture, and reconsider the number of units? That would really serve the system, and we need to use the resources most efficiently.*

4.1.12 Conclusions

The respondents are very positive about the university reform and the new Universities Act (2010). In particular the results are positive with respect to the increased autonomy for the management of HEIs. This is welcomed by the universities. Four out of eight responding universities believe that even more autonomy is needed.

In general we can conclude that the universities that participated in the survey stay close to their core responsibilities. In education there is a strong focus on the core education processes (i.e. securing good graduation rates, education innovation, high quality personnel and quality assurance). In research we also see a focus on essential processes like research staff, research groups, quality assessments and grants/investments. Internationalisation is an import topic in both education and

research. There seems to be less focus on strategic issues (i.e. lifelong learning, profiling, new research fields) and excellence (i.e. supporting strong students). With respect to utilisation we see that the universities also stick to their core, which is knowledge creation and knowledge transfer, but that they stay further away from actually using it themselves via entrepreneurship, patents and consultancy services.

4.2 Survey results for universities of applied sciences

A similar survey exercise was undertaken regarding the UAS. The details and the results are presented in this section of the report. The presentation is structured in the same way as for the universities.

4.2.1 Descriptive statistics

The twenty-four UAS were invited to participate in the survey. Out of these twenty-four UAS, sixteen provided us with answers to most of the questions. Again, this is a very small sample size for any given analysis and for similar reasons as for the university survey, findings should be treated with caution and not be generalised. Therefore it is important to understand that this section provides an overview of the UAS but is far from a statistical analysis. Please note that every figure will include a reference to the sample size in the following way: *(N=number)*.

Two out of these sixteen answered questionnaires come from UAS that were merged after 2008. These UAS were requested to skip questions that concerned the situation in 2008. If for some reason the merged UAS did provide answers about its situation in 2008 these answers were not used in the analysis. The main reason for not incorporating these answers is that in that case the comparison between the current situation and in 2008 is based on different institutions, namely merged and non-merged.

4.2.2 Internal funding policies

The UAS were asked to provide insight into their internal funding allocation policy. The UAS needed to provide a percentage-wise distribution over a set of allocation strategies. This question was asked four times, twice on the topic of education for their situation in 2008 and 2014 and twice on the topic of research, development and innovation (RDI), also for 2008 and 2014. The set of allocation strategies presented to the UAS was different for the questions regarding education and RDI. There are two UAS that merged after 2008. For these UAS no answers could be collected for the situation in 2008.

4.2.2.1 Education

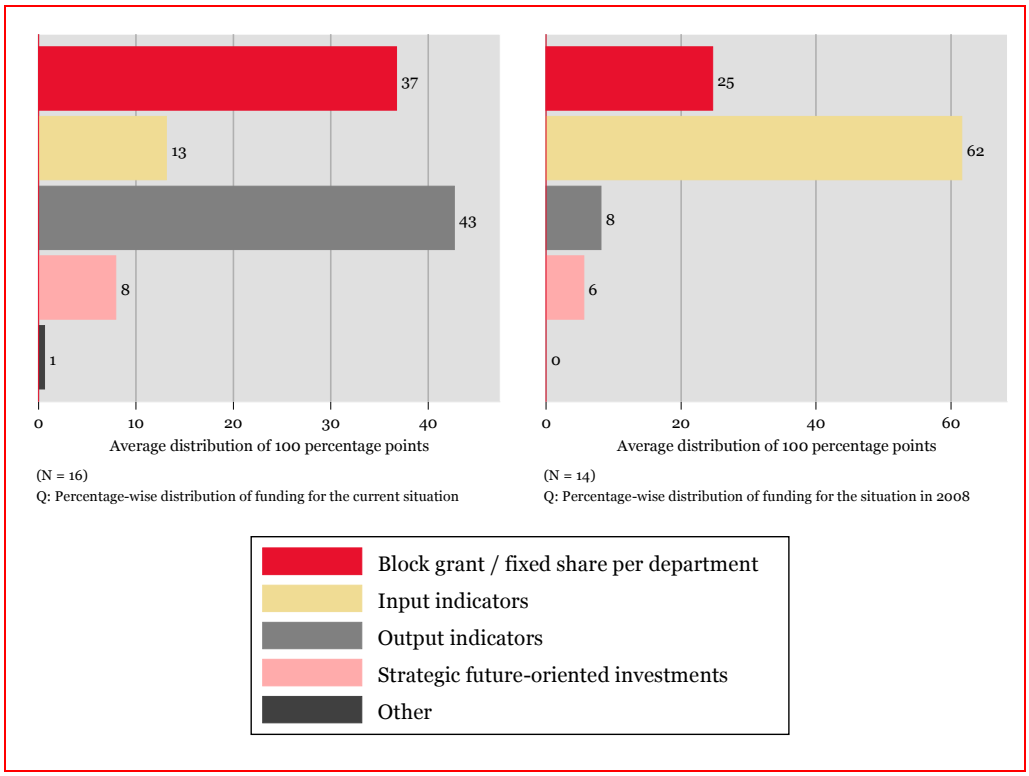
In terms of internal funding allocation for education the following set of allocation strategies was presented to the UAS:

1. Block grants / fixed share per department
2. Input indicators (influx / number of students)
3. Output indicators (graduates, grade levels)
4. Strategic future-oriented investments
5. Other, namely … (Participants were able to provide an open answer)

For this question all answers in the “other” category were redistributed amongst the other categories as they had a good fit. Figure 29 shows the results for the current situation (on the left) and the situation in 2008 (on the right). Block grants and output indicators are currently on average the most important. However, most UAS do not actually base their allocation equally on both criteria. Most UAS base their allocation either on block grants or on output indicators. One UAS indicated to also take annual negotiations into account. The current allocation policy is different from the allocation policy in 2008, when input indicators were the most important criteria, followed by

block grants. Also in 2008, few UAS had a mixed allocation policy; most UAS allocated their funds entirely according to input indicators and some entirely according to block grants. Overall there has been a shift from a focus on input indicators towards a focus on output indicators.

Figure 29 Average percentage-wise distribution for internal funding allocation of resources in education for UAS in current (left) situation and in 2008 (right)



Source: Technopolis 2015

4.2.2.2 RDI

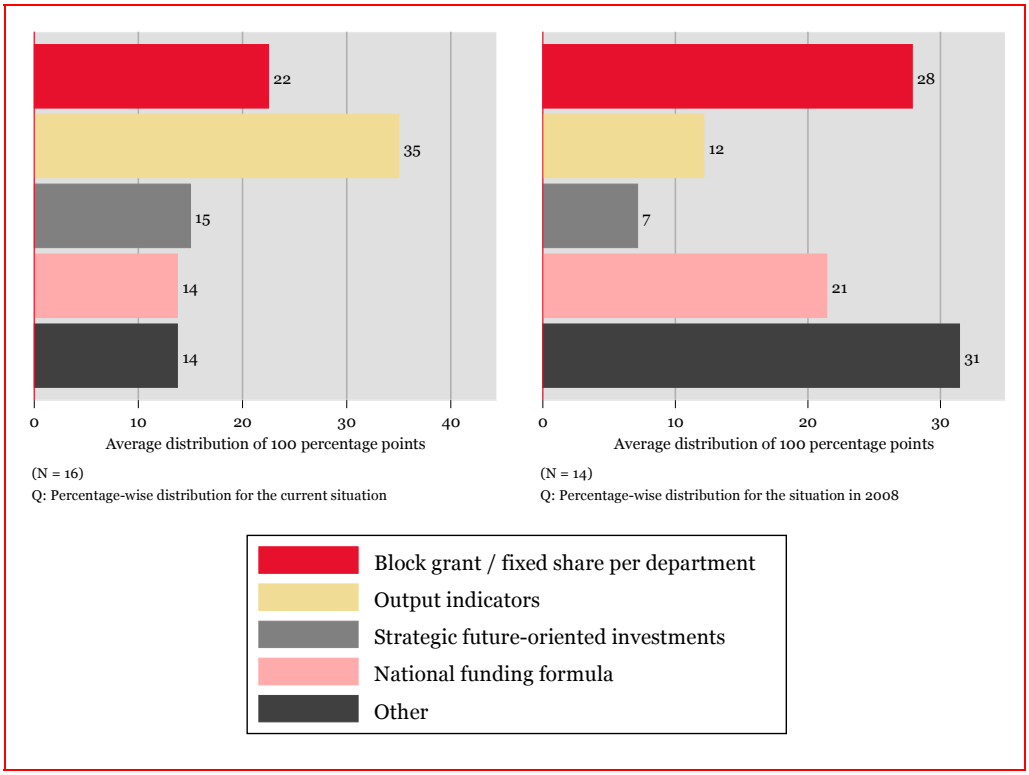
In terms of internal funding allocation for RDI the following set of allocation strategies was presented to the survey participants:

1. Block grants / fixed share per department
2. Output indicators (publications, citations number of PhDs, success in attracting competitive funding)
3. Strategic future-oriented investments
4. National funding formula
5. Other, namely … (Participants were able to provide an open answer)

Figure 30 shows the results. In 2008 "block grants" and "other" were the most important indicators. The "other" category mainly includes project-based indicators, such as funding received for current and future projects. Another important indicator is the national funding formula. As with education funding, most UAS do not actually base their allocation for RDI equally on multiple criteria. Most UAS in 2008 based their allocation either on block grants or on project-based indicators. The current situation differs from 2008; most allocation is now based on output indicators,

followed by block grants. Also in the current situation, the UAS that used the "other" category mentioned mainly project-based indicators.

Figure 30 Average percentage-wise distribution for internal funding allocation of resources in RDI for UAS for current situation (left) and for 2008 (right)



Source: Technopolis 2015

4.2.3 Funding sources

The UAS were asked to provide insight in their funding sources. Compared to 2008, eleven out of the fourteen non-merged UAS are currently able to access more external funding. Moreover, twelve of the fourteen non-merged UAS were able to diversify the sources of external funding in the past six years. Furthermore, all sixteen UAS have strategically resourced support services for external funding activities. These services mostly support RDI-staff recruitment, RDI-staff competence development and new organisational bodies responsible for RDI funding. The external funding addressed is often EU and Tekes funding.

The UAS were then asked to indicate whether their institution has internal funding schemes for various competitive grants and salary bonuses.

Figure 31 shows the results. A minority of the UAS (six out of sixteen) have an internal funding scheme for RDI grants and only three out of the sixteen have such a scheme for education grants. Six out of the sixteen UAS have an internal funding scheme for performance based salary bonuses in RDI; for education we also find six out of the sixteen UAS. So, overall most UAS do not have internal funding schemes for grants and bonuses.

Figure 31 The number of UAS (out of sixteen) with internal funding schemes for:

Internal funding schemes	Number of UAS (n=16)
Internal (competitive) RDI grants	6
Internal (competitive) education grants	3
Performance based RDI salary bonus	6
Performance based education salary bonus	6

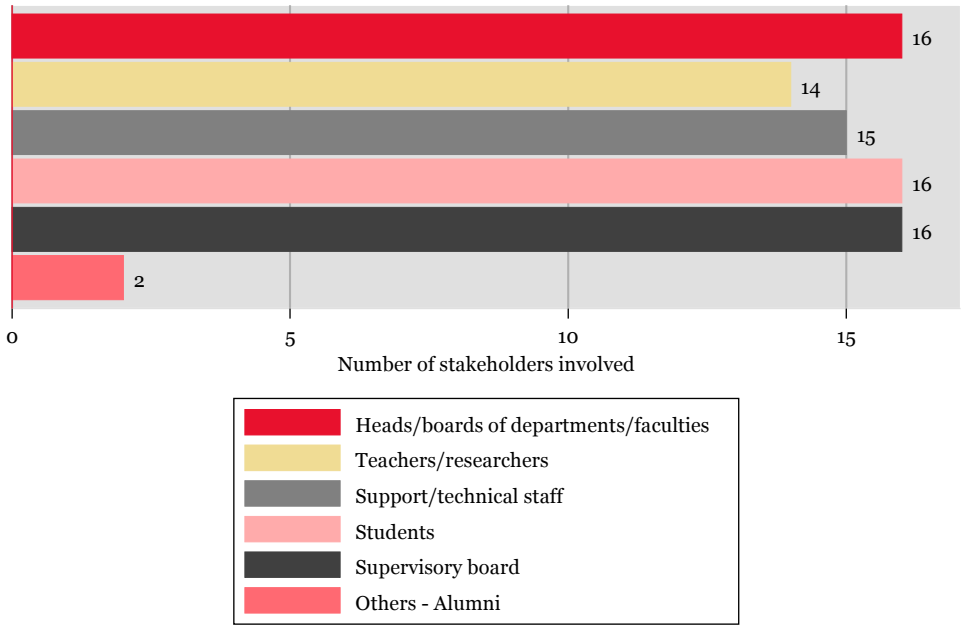
Source: Technopolis 2015

Eleven of the sixteen UAS have centralised funds available for new strategic opportunities. The average amount for these funds is €0.95M (2.7% of total budget). The lowest amount for these funds is €0.15M (2% of total budget). The highest amount for these funds is €2M (5% of total budget).

4.2.4 Strategy of the institution – involvement of stakeholders

On the topic of strategy development, the UAS were asked to indicate which internal and external stakeholders were involved in the strategy development. Figure 32 shows the results for internal stakeholders. (Almost) all UAS indicated that the heads/board of departments/faculties, support/technical staff, students and the supervisory board were involved in the strategy development. Fourteen of sixteen UAS indicated that teachers/researchers were involved as well. Two UAS indicated that there is also another internal stakeholder involved, namely alumni.

Figure 32 Internal stakeholders involved in strategy development

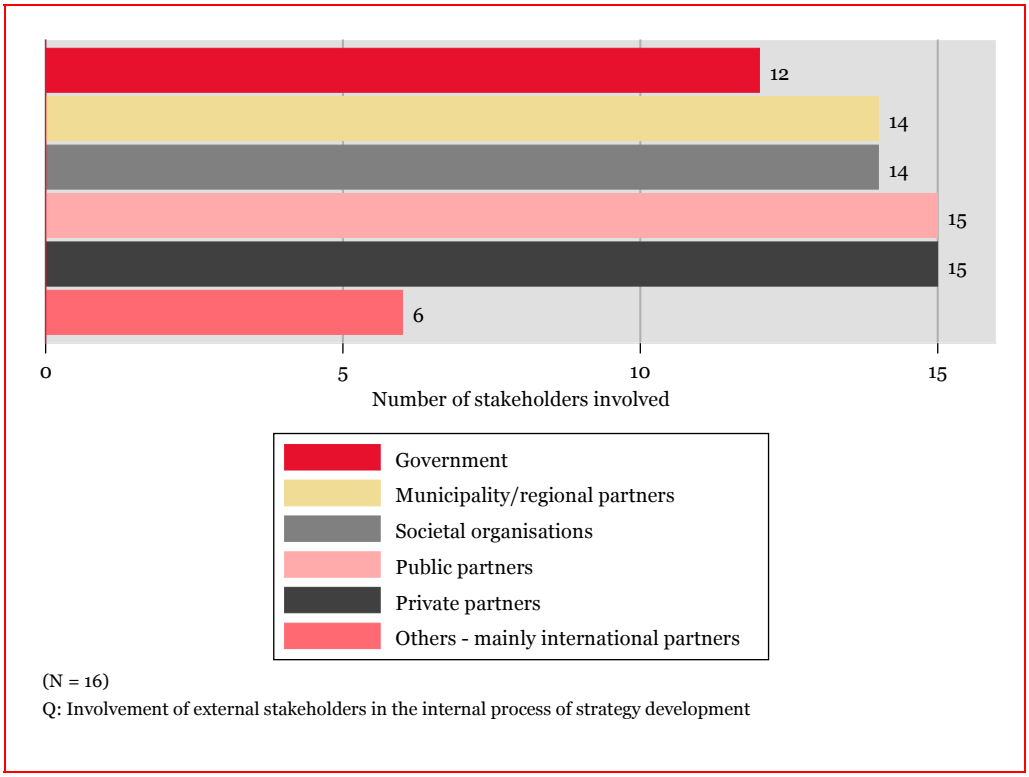


(N = 16)
Q: Involvement of interna; stakeholders in the internal process of strategy development

Source: Technopolis 2015

Figure 33 shows which external stakeholders were involved in the strategy development of UAS. Almost all UAS involve public and private partners. The majority, fourteen of the sixteen UAS, involve the municipality/regional partners and societal organisations. This is in line with the perceived strengths of the UAS; they have a strong regional base. Twelve of the sixteen UAS involve the government as well. Six UAS indicated to involve other stakeholders, mainly international partners.

Figure 33 External stakeholders involved in strategy development



(N = 16)

Q: Involvement of external stakeholders in the internal process of strategy development

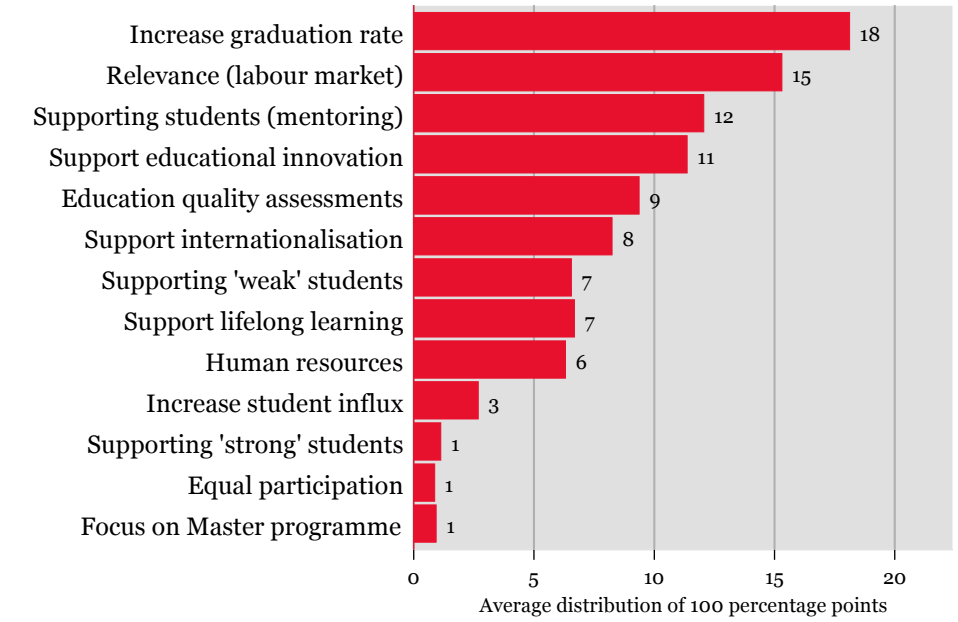
Source: Technopolis 2015

4.2.5 Policy and strategy for education

The UAS were asked to give insight into what elements are considered in educational policy development. The UAS were provided with a list of thirteen elements and were asked to indicate which elements are used in educational policy development. Furthermore the UAS were asked to simultaneously provide insight in how important these elements are in the development of educational policy by distributing 100 percentage points over these elements. In addition, the UAS were given the option to provide other elements.

On average UAS selected eight of the thirteen elements as having importance. Figure 34 shows the average results. The most important element is the increase of graduation rate, followed by improving the relevance for the labour market. Almost none of the UAS indicated that equal participation, the support of strong students or a focus on Master programmes are important in their educational strategy development.

Figure 34 Elements in order of importance for educational policy



(N = 16)
Q: Percentage-wise distribution of importance for educational policy

Source: Technopolis 2015

The UAS were asked to provide best practices on the above rated educational policy elements. They provided diverse examples, however some best practices had common elements. Many concerned the increasing importance of the role of tutors, especially for students that were graduating slowly or had a weak educational background. One UAS mentioned that master students also receive tutors for guidance. Moreover new pedagogical methods, such as e-learning and competence based curricula, are also put forth as best practices.

An interview respondent from one UAS confirms this and adds a remark regarding the teachers:

> *Society is digitalising very fast, and it has effects on the learning content. The UAS and university education must adapt to e-learning and MOOCs. They must try to create new learning possibilities. This is a challenge for the UAS teachers, who can be rather conservative.*

Other best practices that were mentioned at least twice are a strong education quality system and a well-organised connection to the labour market.

4.2.6 Policy and strategy for RDI

The UAS were asked to give insight into what elements are considered in the development of the RDI policy. The UAS were provided with a list of ten elements and asked to distribute 100 points over these elements indicating their importance in the strategy development. In addition, the UAS were given the option to provide other elements. On average the UAS selected 7.5 of the eleven elements as being of importance. Figure 35 shows the results. The most important element is development of collaboration with the industry, increasing the success rate of grant proposals and support for internationalisation. Some indicated to use other criteria for RDI policy,

namely collaboration with other HEIs, integration of RDI and education and regional impact.

The innovation process and cooperation with business is also commented upon in the interviews. The strength and importance of UAS in relation to this issue is stated:

> *The UAS have a good competence for business development. The universities have the right competence to develop new knowledge for society, but their weakness is that they do not have the right competence on the doctoral level for business development.*

However, there is also some concern expressed. The same respondent summarises:

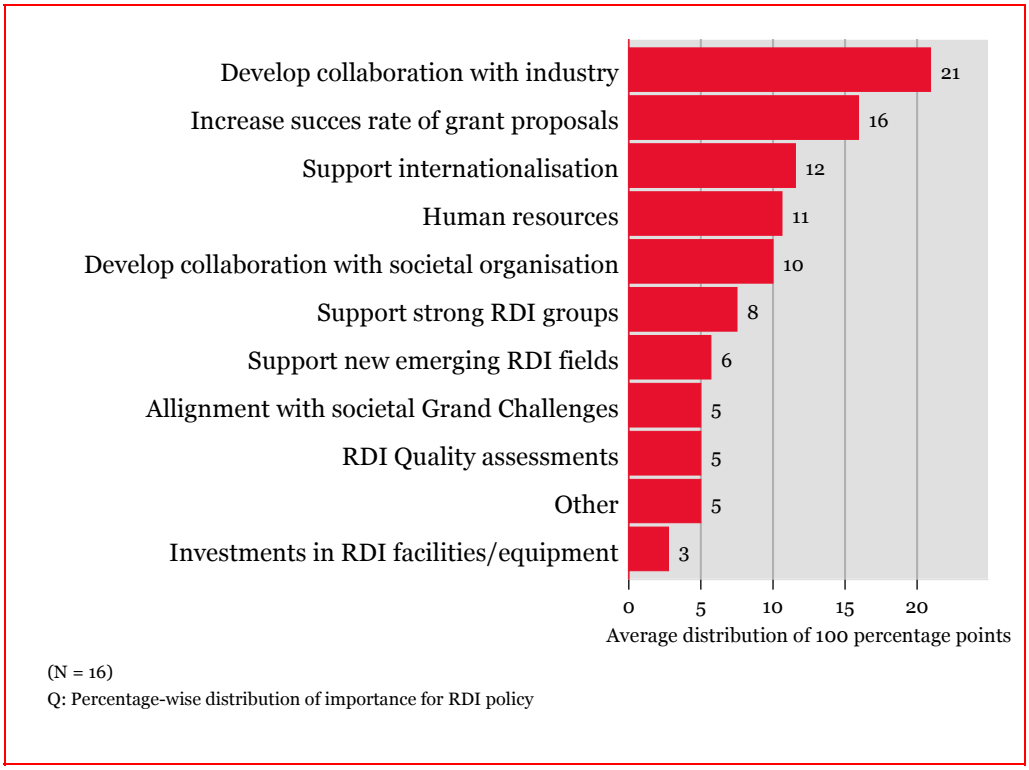
> *Innovation is a very big problem in Finland and the innovation process must change.*

This point is put forward by other interviewees as well. One says:

> *The part of the system that is underperforming is innovation. The Finnish innovation system is rather fragmented and complicated.*

Overall in the elements for RDI policy we see a mix of different issues. The top four elements, namely collaboration, grants, internationalisation and human resources all reflect different issues. A broader strategic approach seems absent, as investments in RDI facilities, alignment with societal grand challenges and new emerging RDI fields score quite low.

Figure 35 Elements in order of importance for RDI policy



(N = 16)
Q: Percentage-wise distribution of importance for RDI policy

Source: Technopolis 2015

The UAS were asked to provide best practices on the above rated RDI policy elements. The UAS provided diverse examples. However several UAS answered that a strategic allocation of funds was their best practice, of which some indicated to have identified a number of focus areas that are funded. Furthermore two UAS indicated that there is

an active collaboration with regional bodies and networks. Also, collaboration with the industry and societal organisations are mentioned. These are indications of demand oriented research, just as could be expected regarding the UAS.

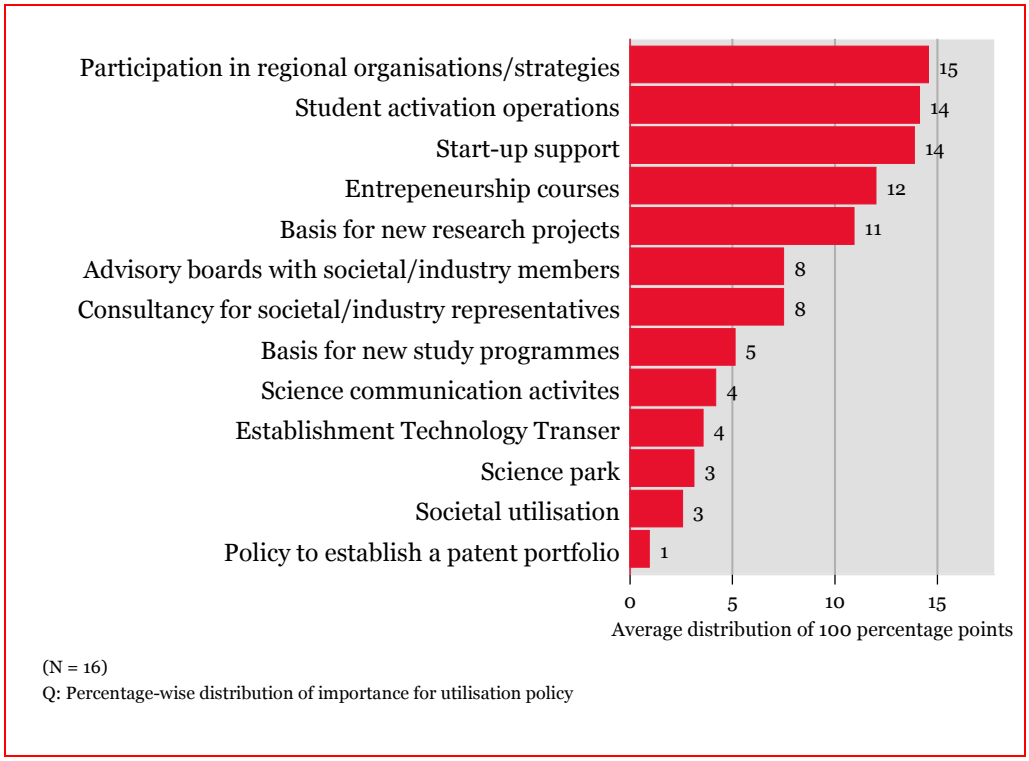
4.2.7 Policy and strategy for utilisation

Similar as for education and RDI policy development, the UAS were also asked to give insight into what elements are considered in the development of their utilisation policy. The UAS were provided with a list of thirteen elements and were again asked to distribute 100 points over these elements indicating their importance in the strategy development.

On average the UAS selected 7.5 of the thirteen elements as having importance. Figure 36 shows the results. The most important elements include participation in regional organisations/strategies, student (entrepreneurial) activation operations, start-up support and entrepreneurial courses. The overall importance of entrepreneurship support is noteworthy. Few of the utilisation policies of the UAS include the establishment of a patent portfolio, societal utilisation or a science park.

When looking at the elements of utilisation it is clear – as expected – that the UAS have a strong focus on applied research and less on fundamental research.

Figure 36 Elements in order of importance for utilisation policy



Source: Technopolis 2015

The UAS were asked to provide best practices on the above rated utilisation policy elements. They provided diverse examples, however some best practices had common elements. Many indicated to have best practices concerning student entrepreneurial activation such as an enterprise accelerator, entrepreneurship/multidisciplinary courses and other forms of activities where the UAS offer students guidance and encouragement for entrepreneurial activities. For example the UAS JAMK has initiated the JAMK generator, a platform that offers diverse entrepreneurial activities

and support. Another best practice that is mentioned more than once is a close (formally agreed) collaboration with regional stakeholders.

4.2.8 Policy reforms for universities of applied sciences

The respondents were asked how they assess the law amendment for UAS that took place in 2013 and the reform that took effect in January 2015.[66] All respondents were (very) positive about these reforms. The respondents were then asked to indicate which two elements that were the most important ones out of a list of six reform elements. Figure 37 shows the results. The most important change is the revision of the funding models followed by HEIs becoming independent legal entities. None of the UAS indicated that the mergers of units within UAS and the revision of education licenses were amongst the most important two changes.

Figure 37 The most important changes of the UAS reform

Most important changes	Votes
Revised funding models	13
HEIs become independent legal entities	10
Increased focus on relevance for work life	4
Linkage between education and RDI	3
Mergers of units within UAS	0
Revision of education licenses	0

Source: Technopolis 2015

Both the funding and mergers have been elaborated upon in the interviews too. One voice from a UAS describes:

> *Some UAS have very poor financial situation. Money only for a few days ahead. We think they should have at least money for two months.*

But there is also concern from the UAS regarding the economy of the universities, when the resources are spread over the present HEIs:

> *We are not really research intensive, but our opinion is that the resources are spread over all the universities and the polytechnics. Do the universities have sufficient resources to perform top level research?*

The issue of mergers soon come up in the interviews. The UAS representatives are mostly negative.

> *One option is to merge universities and UAS. This could be a good idea in metropolitan areas, but not in the rural areas. There should be several models in Finland. Merging will not bring anything good for the northern area. In some other regions, a merger is a better idea, for example in Tampere.*

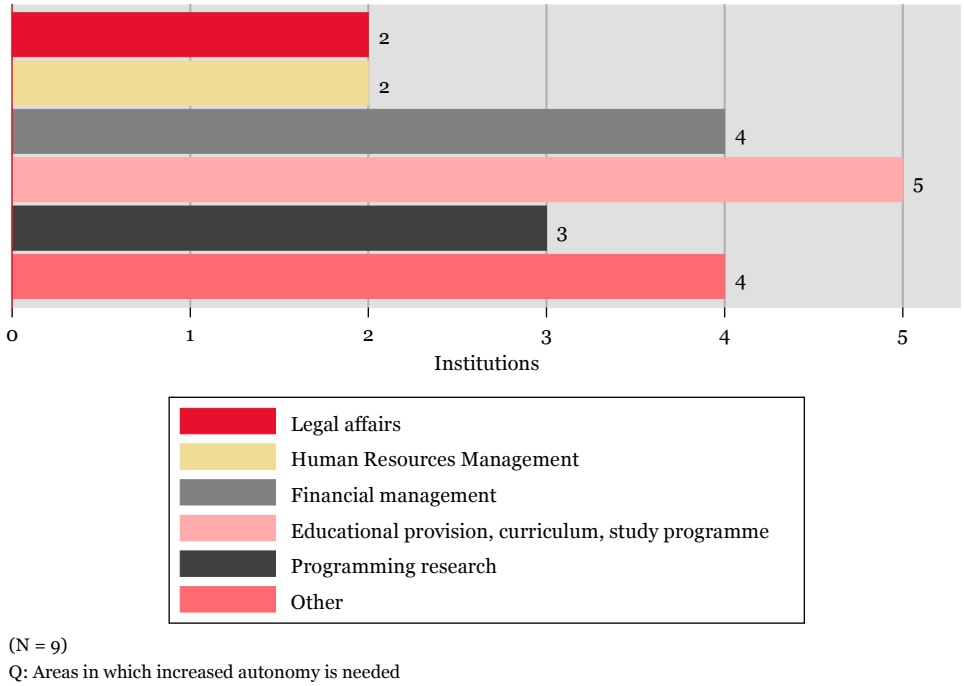
Another UAS representative declares perhaps with certain regret "Maybe yes, but also more strategic work of profiling", when asked about the necessity of mergers or even closedown of institutions. Many UAS interviewees also mention internationalisation. The following statement is quite typical:

[66] The survey was sent out in November 2014.

International collaboration and utilisation needed too. We need more international staff at the HEIs. Mobility and real collaboration with international partners.

The UAS were also asked to indicate whether more autonomy is needed to increase the institutions' performance. Nine of the sixteen UAS believe that more autonomy is required. Figure 38 shows in which areas these nine UAS indicated that more autonomy is needed. Approximately half of the UAS (9 out of 16) indicated that more autonomy is needed in the areas of educational provision/curriculum/study programme and in financial management. Four UAS indicated other areas, such as more independence of the city/municipality as main owner, the ability to set tuition fees for non-EU students and decision freedom concerning the student intake.

Figure 38 Areas in which more autonomy is needed



Source: Technopolis 2015

4.2.9 Strengths, improvements, challenges and threats

The UAS were asked to indicate what their most important strengths, improvement areas, challenges and bottlenecks are. As these were open-ended questions, and diverse responses were given. The following elements were mentioned more than once:

- Strengths

  One of the strengths that were mentioned most often is a strong work life orientation, meaning the education is relevant and there is collaboration between working life organisations and the UAS. Closely tied to this point is the strength of a strong regional base, emphasising their collaboration with local organisations, working towards regional development. Another strength that is mentioned is strong and strategic leadership. To a lesser extent were a good quality assurance

system, a strong financial position and international activities mentioned. Last, some strengths mentioned by a few UAS were commitment of staff and (private) owners, multi-disciplinarity and innovative/flexible pedagogy.

- Improvements areas

  The biggest improvement area is clearly acquiring funding. Some UAS mention funding in general while some indicate that they want to improve in acquiring RDI funding, while some focus their funding needs on EU/international level. Internationalisation is mentioned almost as often as the need for funding. The topic of internationalisation seems to be a general need as (almost) none of the respondents specified which type of internationalisation. To a lesser extent the relation between RDI and education was mentioned as an improvement area. Efficiency and quality of education in general could be improved for some institutions. Quite a few UAS want to improve in terms of utilisation; while some listed utilisation in general there are also a few UAS that mention commercial/profitable knowledge services for market players.

- Challenges

  As the biggest challenge we see again the acquiring and maintaining of funding. Other challenges are far more scattered but there are some interesting challenges that are applicable to several institutions. Some UAS mentioned staffing or human resources as challenges for the future. One UAS reported the competence level of the staff as a challenge, specifically the combination of academic and practical experience, and another UAS reported staffing problems in relation to the student output. There are also challenges mentioned with respect to the future of the Finnish education system, pointing at issues related to the dual model, mergers and independence. It is noteworthy that one UAS explicitly mentioned that they see a possible merger not only as a challenge but also as an opportunity. Other challenges that were only mentioned by a few institutions are increasing export of education and attracting students to the region, as students seem to cluster around big city regions, especially Helsinki.

- Bottlenecks

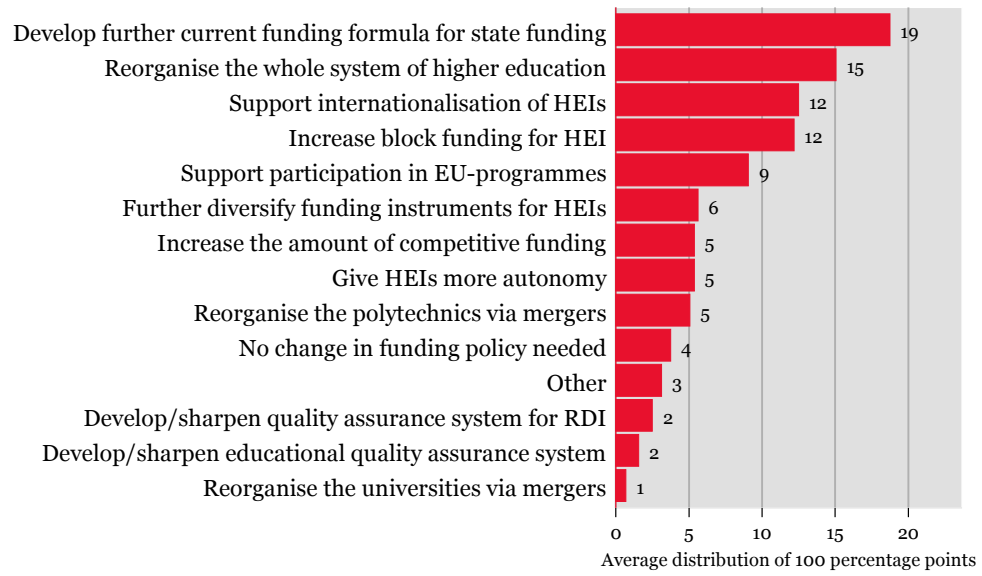
  As bottlenecks we find again the above mentioned funding and personnel/human resources problems. Furthermore there are a lot of issues mentioned concerning legislation. There are quite a few UAS that mention bottlenecks related to the topic of international educational opportunities and legislation. To give some concrete examples about legislation bottlenecks in general, there are issues mentioned about preventing UAS to merge with another UAS or with a university, establish international degree programmes with tuition fees, or offer doctoral level degrees. Also the student influx in certain fields is mentioned as a bottleneck; one UAS is specifically pointing at engineering.

4.2.10 Support from Finnish educational policy

The UAS were asked to give insight into what elements of national Finnish educational policy would help them the most. The UAS were provided with a list of twelve elements and were asked to distribute 100 points over these elements, indicating what elements would help them the most. Figure 39 shows the results.

The UAS indicated that the following elements are the most important: The further development of the current funding formula for state funding, a reorganisation of the whole higher education system (but less important to reorganise universities and UAS through mergers), an increase in block funding and support for internationalisation. A change of the funding system seems to be a very important topic for the UAS as it comes out as one of the major points of the current reform. Almost none of the UAS indicated that development of RDI and education quality assurance systems and a reorganisation of the universities via mergers are important.

Figure 39 Importance of policy elements



(N = 16)
Q: Percentage-wise distribution of how national RDI and higher education policy could help to improve institutions' performance

Source: Technopolis 2015

4.2.11 Future needs and trends

The UAS were asked for their response on several statements concerning the overall structure of the HEIs. The first statement concerned the dual system of universities and UAS. Six out of fourteen responding UAS would like the dual system to be replaced. The UAS were also asked to indicate whether they believe that fourteen universities and twenty-four UAS is the desired number for Finland. For both statements the UAS answered diversely, ranging from 'fully disagree' to 'agree'. Most UAS however are disagreeing or somewhat disagreeing with both the statements. This means that most UAS feel like fourteen universities and twenty-four UAS are not the right numbers for Finland, however their collective standpoint is not very decisive.

The interviews mostly reflect the survey results related to the dual system and the number of HEIs. There is a diversity of viewpoints and they are not always consequent. When it comes to the number of HEIs, some are rather straight-forward. The following three quotations come from three individuals at three different UAS, all in the top management of their institutions:

> *The current number of HEIs is high. Maybe we can have some 20 HEIs.*

> *The big question for the future is to reduce the number of universities. Finland is a quite small country with 14 universities and 24 UAS. There must be further mergers of institutions.*

> *There are too many organisations involved in research, and often the same research is carried out in different places: in universities, in UAS, and in research institutes. There are simply too many organisations and the work is not coordinated.*

Still, this last person thinks that Finland should keep the dual system. Another supporter of the dual system puts it like this:

The dual model works well and has found its place. The universities work in an academic atmosphere involving research and the UAS have developed from colleges into universities.

The UAS were furthermore asked to provide their opinions about a long list of statements. For each statement they were asked to rate the importance and whether they agreed or disagreed with the statement. In Figure 40 all statements and the average reactions to the statements are listed. The left column shows the broad importance categories, so the list of statements is ranked according to their importance within the broad importance categories. To give an example, this means that the five most important statements are the five statements that are highest in the table.

The first thing to note is that on average none of the statements were found to be unimportant, as all statements are at least rated important. There is only one statement found very important on average; this statement ('Student-centred (i.e. blended learning, flipped classroom) learning methods should be fully implemented') is fully agreed upon by most UAS. This means that the UAS are willing to move towards these new types of education. The second most important statement is fully agreed with, which is not strange as interdisciplinarity was mentioned quite often in the section about strengths, improvements, challenges and threats. When looking at the third and fourth most important statements, the UAS only weakly agree that 1) RDI is currently of high quality; and 2) that there are sufficient structures in Finland for utilisation of research findings. Especially for the statement about sufficient structures for utilisation the opinions of the UAS are very diverse, this means that some think there are enough structures while others do not.

It is also interesting to see what statements are less important for the UAS. UAS agree that the grand challenges and societal needs must have a greater influence on the educational content, however it is clear that this does not get the highest priority. Given the section about strengths, improvements, challenges and threats, where many UAS wanted to improve their utilisation and contribute to increased commercialisation and also attract more funding, it is remarkable to see that the statement about 'export of services of HEIs' is not ranked very high in terms of importance. The UAS however do agree that export of these services will become more important.

Figure 40 Average agreement to statements about Higher Education, ranked on average importance (also ranked within categories of importance)

Average Importance	**Statement**	**Average Agreement**
Very Important	Student-centred (i.e. blended learning, flipped classroom) learning methods should be fully implemented	Fully agree
Important	Interdisciplinarity will become more important in both research and education	Fully agree
	Research quality at Finnish HEIs is generally high	Somewhat agree
	There are sufficient structures in Finland for utilisation of research findings	Somewhat agree
	Recruitment of the staff will become the most important future investment for HEIs	Agree
	Collaboration with industry raises the quality of research at HEIs	Agree

Average Importance	Statement	Average Agreement
	Collaboration with industry will become more important than basic research	Agree
	The grand challenges and societal needs must have a greater influence on which research is being supported	Agree
	Distinct profiling and branding of HEIs become more important	Agree
	Student selection will become the most important future investment for HEIs	Somewhat agree
	There will be more online courses and less students on campus	Agree
	A HEI should be able to grant both academic and professionally oriented HE degrees	Somewhat agree
	Universities of applied sciences should have a regional focus rather than national or international	Somewhat agree
	Foreign students from outside EU need to pay tuition fees	Agree
	Better regional embedding is essential for all HEIs	Somewhat agree
	Finland needs more than one internationally top-ranked university, even if means to re-allocate national resources from weaker to stronger HEIs	Somewhat disagree
	All the students need to pay tuition fees	Disagree
	Export of services of HEIs becomes more important	Agree
	The grand challenges and societal needs must have a greater influence on the educational content	Agree

Source: Technopolis 2015

4.2.12 Conclusions

Overall we can conclude that the educational policy is focused on internal and essential processes and less on external and more strategic issues. For research we see a balanced focus with strong ties towards regional actors and industry. Similarly we see that utilisation is focused on applied research instead of fundamental research, which matches the profile of the UAS. Furthermore many issues were raised by the UAS about acquiring funding while it is noteworthy to mention that some UAS indicated that their financial position is one of their strengths.

4.3 Cooperation between universities and universities of applied sciences

The survey results indicate and sometimes explicitly show concerns regarding the HE system and its design. Questions about the number of HEIs, institutional funding, mergers, and the dual model as such are intertwined. While the survey essentially only touches upon the issues of how the dual model works, the interviews in contrast provide a very rich source of opinions and arguments related to this. It is much more than a matter of support or non-support for the dual model; many interviewees have

discussed the dual model both in terms of its positive features as well as its less functional ones.

The relation between universities and UAS is an issue that is brought up in essentially every interview. Whichever point the respondent takes, it is clear that many respondents feel strong concern regarding how the system functions today with respect to cooperation between universities and UAS and their relations. At the risk of presenting a large number of lengthy quotations, the qualitative information collected from the stakeholder interviews is important to include as it emphasises the concerns felt in relation to this issue. The magnitude and relative agreement of the importance of the issue is a signal in itself. Each paragraph below is an individual quotation.

> *Decrease the number of HEIs. But we must look at activities and quality of them, and of the whole HEIs. The whole picture. The dual model is not functioning as it should. If we should keep it, there should be more cooperation between UAS and universities. But the legislation hinders it or makes it too complicated.*
>
> *There are many options for cooperation between universities and polytechnics when it comes to for example infrastructure and research connected to knowledge skills approaches. In terms of education, there are also room for changes. There is a need for a re-evaluation of the dual model. Universities and polytechnics must find each other.*
>
> *The way forward is closer collaboration between the institutions. That is both inside universities, where there is room for improvement, and collaboration between other higher education institutions. The universities must talk to each other. Finland is a small country, and they must be able to come to smooth agreements on division of work between universities to improve the quality of the higher education system.*

Some respondents speak about the issue from an educational point of view:

> *There are too many polytechnics today. It is also a mistake to call them universities of applied sciences. Some of them want PhD degrees and that is not right. It can also be problematic with the master's degrees at the polytechnics, since the employers have difficulties understanding the difference between the university and the polytechnic degree.*
>
> *In the future, there must be the same structure for diplomas at universities and UAS. At the scientific universities, the bachelor level is three years and the masters level two years. At UAS there is a four+one model. Instead, there should be the same model (3+2) for diplomas at universities and UAS.*
>
> *The system may be too rigid. There are students who want to cross the border between polytechnics and universities. It is possible but difficult. The dual system is in this respect dysfunctional. But the labour market is more protective of the old system as it knows well what the students who get out of the system have for skills. Finland should maybe deconstruct the whole system and jump into the UK model, but I don't like it too much as I like the model with polytechnics. Some barriers between polytechnics and universities should be removed.*

While thinking differently about the dual model than the last respondent above, one of the student unions makes a similar point regarding cooperation:

> *We are content with the dual system. Choice between a more traditional or a more work life oriented type of study. More cooperation between the two types of institutions would be helpful.*

Yet others think about how to serve industry in the best way, and thereby touch upon the regional perspective:

Higher education institutions (universities and UAS) must together help the industry find new products and business systems. However the roles of the HEIs should be clearer. UAS are strong in working life cooperation. All the students from [UAS X] do their graduation work for the industry. The UAS also work for the SMEs. The universities are strong in publishing. It would be better if they could work together with innovative services, and get full use of the knowledge.

The universities should not serve the regions only; they should serve the nation and live up to international standards. Regional universities concentrate on the regional level, and it does not make them good players on the international level.

One university rector makes an invitation:

I am ready to involve in more collaboration with them [the UAS; author's remark]. There is an academic drift in them – they imitate the universities – but there is also an imitation from universities' side towards them as we are trying to utilise our research more. A certain division of labour is needed, as well as interfaces for collaboration.

Or to put it short:

Collaboration between universities and UAS is scarce.

One of the student unions phrases it bluntly:

We are in a desperate need of a structural renewal. We need to agree on a new take for the system. Each institution needs to find its focus areas. Cost efficiency should not be made reducing the quality, but in profiling.

One respondent, again a university rector, takes the issue one step further. This rector's discomfort can also be read as an advice or even plead to the ministry. We end this section with the rector's words:

The ministry should consider forcing this process by changing the legislation and break down the dual system. And the tough decisions, if we should close down a whole faculty or department, this cannot be done by the universities themselves, it needs to be done by the ministry.

5. Reflections and recommendations

5.1 Reflections

The international country benchmarks presented here with the survey, the interviews, and the review by the international panel, together with international comparative statistics, national statistics and evaluations, all provide evidence to suggest that the Finnish HE system is generally well-functioning and well-performing.

However, there is always room for improvements and the ambitions in Finland are very high. There are certain parts or features of the system that may need to be reconsidered and reformed. The fact that the system as a whole is functional and well-performing does not mean that all parts of it are functioning in an optimal way. There are some less functional parts or characteristics and there are some less well-performing corners of the system.

The concern regarding the Finnish HE system that has been raised and forms the basis and the reason for this study seems to have two sides; there is certain concern regarding the performance and the functionality of the HE system, but also this concern is related to circumstances that are external to the HE system, like the state of the Finnish economy overall or Finland's performance and competitiveness on the global markets. The Finnish national economy and Finland's general standing in international comparison form the context for the HE system in the country, but this study is targeting the functionality of the HE system and not the competitiveness of Finland in a wider sense. Thus, we need to distinguish the concerns that relate to the HE system from these wider considerations.

There is another distinction that needs to be made. When we develop and elaborate on recommendations for further action, we need to be clear about whom we address. Given the substantial autonomy for HEIs, the government has a limited remit to do certain things; instead, it is the responsibility of the HEIs themselves to take action when it comes to some of the recommendations. For instance, several of the recommendations presented by the international panel in its report address HEI management rather than the ministry or the government.

5.1.1 The dual system

Finland's dual system is a key matter for concern and reflection. There are many sides to this; the existence and design of the dual system include issues related to the 'topology' of the HEI landscape, for example, the restructuring of the system in terms of mergers and other kinds of organisational change, regional outreach, and cooperation with industry and society, to mention a few.

One person we met during the course of the study said: "In Finland we have a tendency to think in terms of either/or: either we have a dual system, or we have a very unified system where all HEIs are the same". There may be a point in that. Sometimes during the work with this study, the whole question has boiled down to 'should we keep or terminate the dual system?'. The existence of a dual system is not an either/or question. As shown in all of the four benchmark countries, dual systems take many different forms, none look exactly the same. While our empirical investigations show strong and unified support for the reformation of the *system*, they do not show strong unified support for reformation of the *dual* system. Some critics target the very duality of the system, but others focus their critique and concern towards other features of the HE system. Overall, there are good arguments, strong evidence and also strong support for reformation of the dual system *as it looks today*.

It is clear that the universities and the UAS must overcome the dual divide between them and intensify their collaboration. It is not a matter of forming only one type of HEIs where all look the same and therefore can collaborate; instead it is a matter of mutual knowledge transfer and nurturing of each other's respective operations in order to become more effective, innovative and contribute more to the Finnish society.

The HEIs should keep profiling themselves but they need to develop their external collaboration as well in order to get knowledge input and inspiration from others. Also, to allow all HEIs to develop themselves and their profiles in any way that they find promising is only a logic consequence of the autonomy reform. Each HEI has a unique opportunity to profile itself according to its own perceived strengths and competitive edge and it is up to the HEIs themselves to choose the path. The fundamental idea behind this vision is that the HEIs should be left with real responsibility for their profiling and their development, but also be held accountable when it comes to the quality of education and research, and the outcome of their external cooperation. Any legal barriers towards intensified collaboration need to be removed.

5.1.2 Clarification and diversification of funding streams

What is said in the section above implies that all HEIs ought to have similar legal access to the available competitive funding streams in the sense that they should all be eligible to apply for competitive funding. Whether they will be successful is a matter of how well they fulfil the respective funding organisation's requirements. It is for instance reasonable that the Academy of Finland keeps its high requirements of academic excellence and only provides funding to those that can prove such high academic standards. Tekes on the other hand would be well positioned to provide competitive funding to research of a more applied kind, and to collaborative projects where the business sector is involved. Consequently those UAS that want to develop their applied research and manifest their role as regional players would have possibilities to attract external funding for this – as well as universities. A diversification of the funding of HEIs opens up possibilities for the HEIs to develop in various ways and it supports their profiling. In this respect, it is important that there is a clarified division of labour between the dominant funding organisations in Finland. Tekes' reduction of funding of applied research which is not predetermined or linked to specific programmes or company needs has resulted in a gap between its increasingly company-orientated funding and the basic research typically funded by the Academy of Finland. It is important to reach an appropriate and clearer division of responsibilities and functions between the two funding agencies.[67] [68]

5.1.2.1 Topology of the HEI landscape

The Finnish HEI landscape is characterised by one very dominating university, a small handful of relatively comprehensive but still smaller universities, a handful of even smaller universities, and the 24 UAS of different sizes and with different profiles. In addition there are a number of university centres and institutes. Altogether the 38 HEIs represent a wide spectrum in terms of size and profile. They are also geographically located around the country to reasonably well reflect where people live in Finland.

Measured against comparable countries, the number of HEIs in Finland is rather high in relation to the size of the population. Certain attention needs to be paid to the fact that Finland is a geographically widespread country, and in that respect more similar to Norway and Sweden rather than the Netherlands or Switzerland. But even in that comparison, Finland still has many HEIs. Most towns of some size have a UAS, and the slightly larger cities often have a university (or two) plus a UAS. The Helsinki metropolitan area contains a number of universities and UAS.

The sheer number of HEIs may appear too high to form an efficient and effective system, but this is actually quite difficult to prove. It is not an absolute truth that a

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[67] E. Arnold, T. Luukkonen, P. Boekholt, A. Nooijen, Z. Jávorka & F. Zuijdam, (2013), Evaluation of the Academy of Finland, *Reports of the Ministry of Education and Culture, Finland* 2013:14.

[68] P. Stern, A. Håkansson, M. Tähtinen, J. Angelis, T. Saksman Harb and T. Åström (2014): "Evaluation of the NeoBio and SymBio programmes", *Tekes Report* 3/2014.

system with a few large units is more efficient and more qualitative that a system with many smaller units, or a system with both a few larger units and several smaller units side by side. However, what appears inefficient is the situation created by the dual system where universities and UAS exist side by side in the same city but essentially without cooperation, or with limited cooperation. This is a negative kind of HEI topology that seems to be the result of the dual system. Institutions that do not cooperate because of legislative or formal organisational reasons are out of date in their set up and this cannot serve Finnish society and the economy in the best way. The dual system has not been a driver for cooperation and this has grown into a real problem. Cooperation between universities and UAS ought to increase in volume and be intensified in character.

5.1.2.2 Mergers

The Finnish HEI system should be open to more mergers. Even though the survey and the interviews do not provide strong support for more mergers, it is likely that respondents think of enforced mergers rather than voluntary ones. There is no strong resistance against mergers either. If there is an opportunity for mergers, there is no reason why they cannot take place between two or more UAS, universities or bring the two parts of the system together. In the other Nordic neighbour countries, there have been several mergers, mostly in Norway and Denmark, and sometimes between universities and other types of smaller units; typically colleges in Norway and institutes in Denmark. These mergers have led to a more concentrated HEI system and larger and indeed stronger HEIs in those countries. It could be noted that only rarely have universities merged with universities.

The ongoing work towards deeper collaboration between the three HEIs in Tampere is promising and an example of what could be possible to copy and multiply in more places in Finland. The government needs to ensure that there are no restrictions towards this type of cooperation, neither in the shape of alliances nor on the programme level. This also goes for full mergers. The government could provide financial support for those who decide to enter into such processes in order to create incentives. Merging with a partner HEI is in the short perspective a rather costly undertaking.

5.1.2.3 Regional outreach

A consequence of the dual system – or is it a reason for it? – is that the UAS are regarded as having the regional focus. They are expected to take a regional role both as education providers and as partners for the regional business sector. Therefore it has been legitimate and reasonable for essentially any town in Finland to claim the right to a UAS, and to keep the one they have.

This perspective is not entirely positive from a scientific quality point of view. There is a potential conflict between financially supporting a HEI for regional policy reasons, and to support it because its scientific operations are of high quality.

A regional perspective could be argued to be justified in a country with a small population and a vast geographic area such as Finland. Finland shares this situation with Norway and Sweden, and other countries as well with large areas and relatively small populations. One must still ask at least two questions related to this: First, how many HEIs should there be all in all, and how close to each other should they be located? The answer relates to how many inhabitants a HEI should serve. Secondly, do the HEIs that are in place provide sufficient scientific quality? HEIs cost money and the more there are, the higher the costs. If the scientific quality is perceived to be insufficient, more money is needed in order to raise the quality. Do the government have more money or can the resources be distributed in another way?

We are trying to point at the simple and obvious circumstances with these reflections. Can Finland afford to have HEIs in such numbers, some with questionable scientific quality? If the answer is yes, then there is no problem. If the answer is no, then

something needs to be done to change the situation. A HEI with insufficient quality will not serve the regional community well.

UAS are often close to the local business and SMEs, they have a good ability to communicate with the SMEs and they know them well. They are also channel for local enterprise to reach out. This is an opportunity for UAS in the future. UAS have students, with language skills and other skills that are valued by the industry. In some respects, the UAS have a better communication position than universities. In this way, UAS have good opportunities to access funding for what they are good at, and not just because they play the regional policy card.

5.1.3 Internationalisation

Substantial concern has been expressed regarding the level of internationalisation in the Finnish HE system, in both the interviews and in the survey. The international comparisons support this. Indeed, Finnish HEIs seem to be less internationalised than the HEIs in the benchmark countries and less internationalised that they ought to be. It is likely that significant efforts need to be undertaken when it comes to both student and staff mobility, and level and intensity of international research collaboration. The HEIs need to take clear steps towards reforming their own recruitment strategies where they break with prevailing internally oriented recruitments. But it is not only a matter of having a few more foreign students on campus or recruit a few foreign researchers/teachers, it is a more comprehensive institutional attitude that needs to be created where the university or the UAS sees itself as a real player on an international academic arena. It must be completely normal for all staff and students to develop international contacts and to participate in international exchange and engage in international research collaboration. The whole mind-set of the system and the institutions must be better internationalised.

Finland shares this situation at least in part with some of its neighbouring countries. Norwegian and Swedish universities face similar problems. There may be good practices to be inspired by in those countries.

Internationalisation has a certain cost in the beginning. The HEIs in Finland need to show commitment to the task and put effective support measures in place. As it is in part a matter of changing attitudes, the younger generation should probably be a specific focus – changing the attitudes of the older generation is well known to be more difficult. Significantly more students, doctoral students and young researchers should be given the opportunity to spend some time abroad. Thereby the attitudes towards spending time at a foreign HEI and engage in international collaboration are likely to slowly change. A coming generation that perceives periods abroad as a normal feature of an academic career would be a great achievement.

Tuition fees for students outside of the EU/EES area has been raised in this study, in particular in the interviews. The Danish and Swedish experiences indicate that the number of foreign students from outside of the EU/EES area that come to study will decrease dramatically the first years after such fees have been introduced, thus having a rather negative impact on the system from an internationalisation point of view. After a few years, the number of incoming students tends to slowly increase. If it is a matter of reducing the cost burden of these students for the Finnish HEIs, introducing fees may be considered, but from an educational and internationalisation point of view, it may be a less fortunate move, at least in a five to ten year perspective. But it is a complex issue as it is a matter of what kind of HE system Finland wants to have, and in a longer perspective, it is not certain that there will be fewer foreign students on Finnish campuses, as tuition fees will force the HEIs to more actively recruit foreign students and also develop better routines for receiving them and hosting them, thus developing the HEIs as more attractive to foreign students in general.

5.1.4 Quality of education

The dual divide is also a problem when it comes to student transfer between universities and UAS. It is possible to transfer, but it is apparently troublesome and potentially time consuming. We see no problem with the respective two tracks as such, but young people who feel that they made the wrong choice must be able to switch track without unreasonable efforts. While it is difficult to make substantial changes in the whole degree system, not least due to the coherence of systems within the Bologna process, transfers between universities and UAS should be made easier. Some inspiration can be found in our benchmark countries.

There is awareness and a strong interest from the HEIs regarding developments in teaching with strong concern if measures are not put in place to ensure consistent quality throughout the system. Teaching methods need to be modernised and the term 'digitalisation' came up numerous times in our interviews. New ways of teaching and learning need to be developed and practices as traditional classroom based education is no longer sufficient. The International Panel's report echoes these reflections. Finland is the envy of most other countries when it comes to its educational quality and international scores, so there is a strong base to build on. The potential pride in the Finnish educational structures must however not be a hindrance towards necessary development and modernisation of the higher education methods. Both teaching and learning techniques as well as the whole curricula should be subject to a steady ongoing renewal. From what we can see in this study, essentially all stakeholders are in favour of this.

5.1.5 A given mandate, and an expectation

The Finnish HE system does very well when it comes to international comparisons of education quality. Finland is an innovation leader according to the Innovation Union scoreboard. There are also some strong achievements in research. In spite of the data, many stakeholders and respondents express dissatisfaction in the country's performance. "Drastic changes" and "a desperate need of a structural renewal" has been called for, with many other more measured but similar comments being voiced throughout this study. There is almost complete unity when it comes to the perceived need for change and renewal. In this respect, we have met an unusually united academic community. The opinions of what needs to be done differ, but less so than one might expect. Although nobody wants to be subject to budget cuts or other types of more extreme treatment as a consequence of reforms, there is relative agreement that the number of HEIs is too high, that the education needs to be modernised, that the whole HEI sector needs to internationalise, and that the innovation system needs to be revisited and made more effective, in particular when it comes to knowledge transfer. There is a strong sense of objective to strengthen Finnish international competitiveness and create new jobs. To underline the point once more: there is a wide, not to say considerable, awareness throughout the system that further reforms are necessary and there is relative agreement that such reforms should target at least the above-mentioned areas and that the performance needs to improve. If the ministry and the government are in search for a mandate from the HE system to launch reforms, they got it. More so, there is an expectation on the ministry to take action.

5.2 Recommendations

While the reflections above contain conclusions, ideas and some suggestions for change that we think would deserve to be further discussed and explored, and seriously considered, we present a set of distinct recommendations in the following.

The International Panel has arrived at a set of recommendations after having concluded their part of the project and authored their report. The Panel's recommendations are found in the Panel's report (Appendix A). These recommendations have been taken into account when we have formulated the overall recommendations below.

Based on relevant previous literature, national and international statistics and the empirical findings from this study, including the International Panel's review, we recommend the Finnish governmental authorities to take adequate measures related to the following points:

- Treat the universities and the universities of applied sciences in a similar way. This would mean comparable external funding opportunities and quality assessment criteria. The reformed funding structure for UAS is a step in the right direction. Both universities and UAS should have possibilities to grow and develop their operations and profile themselves. This means that UAS should be just as eligible to conduct research and apply for research funding as the universities. There is no reason why different quality assessment criteria should be applied to UAS than to universities. Those institutions that do not live up to the expected standards or fail to attract sufficient funding need to reconsider their situation, and should get the government's advice and assistance in doing so. HEIs that show budget deficits or insufficient scientific quality cannot continue to operate as before.
- The quality of both teaching and research should be the emphasis of the UAS rather than the regional role. There is a strong regional role for them to play but the UAS are first and foremost knowledge producing organisations and it is as strong knowledge producing organisations that they can play a better regional role in the future. This means that both universities and UAS have the same fundamental *raison d'etre*.
- Remove any barriers towards increased and improved communication and cooperation between UAS and universities. This includes the possibility to form institutional alliances and even to merge for those HEIs that wishes to do so. In most cases the improved cooperation will result in harmonised study programmes and the development of joint study programmes, for instance. There is also a matter of increased research collaboration. The HEIs should be free to make their operations more relevant and efficient through increased and intensified cooperation in both education and research, with other HEIs and with business and society, and by reducing the number of parallel and partly competing programmes or subjects. It is up the HEIs to undertake the rationalisation and profiling changes that they want, but it is the government's responsibility to ensure that there are no legislative barriers towards such undertakings.
- The difficulties for students to transfer between study programmes and courses at universities and UAS need to decrease. There are possibilities to transfer today but we have heard repeated witness that it is troublesome and time consuming. The system is perceived as inflexible and rigid, creating obstacles instead of opportunities for young people who wish to transfer in order to shape their own study profile, or simply want to change between the two tracks for any other reason. The separation between study programmes at universities and UAS is too strong and the mental and organisational distance between them need to shorten.
- Voices are raised for the need of rapid progress regarding modernisation of teaching and learning methods, including digitalisation. Innovative and alternative ways of providing higher education ought to be explored. This is mostly a matter for the HEIs themselves, but we recommend the governmental authorities to consider any initiative that can support and speed up such a process.
- There are strong indications that Finnish higher education and research are in great need of strengthened internationalisation. There are many aspects to this, and it is a matter for stakeholders on several levels in the system. For instance, the relatively low level of internationalisation seems to be a question of general openness towards the surrounding global academic community, as well as a question of more concrete opportunities and support measures aimed towards individuals and institutions to engage in international exchange and interaction. We strongly recommend the ministry and other governmental authorities to

consider any action that could help transforming the Finnish academic community towards a more internationalised character.

- Some of the efforts to increase the level of internationalisation could be specifically aimed at the young generation; first and foremost PhD students but also young researchers on postdoctoral level. Changing the attitudes towards international contacts and concrete international collaboration including mobility is an essential part of a long term transformation of the system's openness towards the international community and willingness to involve in more international collaborations. The ministry should ensure that there are good opportunities and also strong expectations on PhD students to spend part of their training, one or two semesters, at a foreign institution. A specific support scheme should be set up by any of the Finnish funding organisations. We recommend that the scale of such a scheme or scholarship programme is sufficient enough to have real impact on systems level; this probably means that at least one hundred PhD students should get the opportunity to spend time abroad every year. The ministry or any other governmental authority should furthermore evaluate if additional support besides what is available today needs to be provided for postdoctoral researchers in order to increase the available funds for a postdoctoral period abroad and create an expectation that such a period is a more or less mandatory step for anyone who wants to pursue an academic career. When it comes to reformed recruitment behaviour, it is a matter for the HEIs themselves, but the ministry should clarify its strong expectation that they swiftly revisit their own recruitment policies and make necessary changes in direction of increased transparency and external, and international, advertisement of positions.
- The ministry should consider in what way FINEEC could be used more in the transformation and development of the system. For instance FINEEC could get the mandate to evaluate relevance and innovation capacity in the HE system, besides its current tasks. Our impression is that today, FINEEC does not have very much of an opinion of what can be improved with reference to entrepreneurship and relevance of the education. FINEEC needs to sharpen its instruments and its approach so it can contribute to real quality improvement and a quality safeguarding mentality at the HEIs. Now the focus seems to be too much on the plain quality of education but without taking into account what the education leads to.

Appendix A Report of the International Panel

Review of Finnish Higher Education System, 2015

A.1 Context

The Ministry of Education and Culture established a process to review the Finnish Higher Education System in order to analyse its strengths and weaknesses and identify proposals to improve the higher education system and strengthen Finland's innovation system. As part of the process, an International Panel of experts (see Appendix 1) was assembled to review the Finnish experience in the context of worldwide experiences and implementation models. The panel met in Helsinki from 15-18 February 2015 (see Appendix 2).

The International Panel was asked to consider the following issues, and make a report.

- What are the main characteristics of the Finnish Higher Education (HE) system and how has the system developed over the last decade? How has the system dealt with the major policy trends? How does the Finnish HE system compare to other European systems? Are there differences in operating conditions and profiles of institutions depending on location (capital, regional, rural)?
- How does the Finnish HE system perform in terms of the three missions (education, research and utilisation)? How does the Finnish system score compared to other European countries? In which domains it is leading and in which domains it is under-performing?
- What are the (perceived) bottlenecks in the system? What are the (perceived) strengths of the system?
- Is the Finnish HE system "future proof"? What are the major trends and (internal and external) developments that will influence the Finnish HE system? In which way will it influence the system? What is the appropriate way to react to these developments?
- What is the way forward for the Finnish HE system? Which development proposals should be implemented?

A.2 Introduction

A.2.1 Overview of Finnish Higher Education System

This review of Finnish Higher Education is being undertaken against the backdrop of significant change in the domestic and world economy. Worldwide, the higher education landscape is being transformed into a sector with continually expanding global reach and significance. Participation rates are rising rapidly to a situation, across most developed countries, in which the vast majority of the population are being educated to advanced levels with significances for sustainable social, economic and personal achievement. Higher education is also being increasingly internationalised; its success is tied very closely to that of its nation state and vice versa. This has raised the competitive stakes, and placed higher education at the fulcrum of national economic policy with implications for human capital and research capacity and capability.

Higher education plays a major role by graduating smart, creative individuals who can produce new knowledge, transfer and translate knowledge and innovate. Not only do graduates tend to enjoy better health, but they are likely to be more interested in politics and public affairs, to participate more actively in civil society, and to be more

trusting and supportive of other people. Democratic societies require an actively-engaged citizenry.

From an external perspective, Finland has a very successful higher education system, of which the society should be immensely proud. Finland ranks amongst the top performing countries in the world, as far as system growth and indicators of quality are concerned. It is impressive with respect to entry and participation rates to higher education, the rate of doctoral awards, the percentage of the GDP spent on higher education and research, academic publications, etc. The country's performance in PISA remains amongst the highest in the OECD albeit there have been some slippages over the years. Finland has a highly reflective higher education policy scene, in which the major actors of the system often discuss jointly and publicly the state of the system and possible future policies. There are significant systematic analyses and major reports.[69] International experts are regularly invited to be involved in such accounts, reviews and discussions indicating the extent to which international comparison have become an integral of these joint public reflections on the state and the future of higher education.

In this context, it is worth noting that Finnish higher education policies combine a healthy balance between international benchmarking and national cultural values. Thus, Finnish society is confident to set its own path and not simply imitate and follow global "Zeitgeist" preoccupations of what a good or modern higher education system would be. As part of the European Union, Finland pays attention to the European policy, for example with respect to Bologna, research policy, smart specialisation and regionalisation.[70] There have been strenuous efforts to ensure that Finland excels in those areas where being globally competitive is highly desirable, but there are a number of features where other priorities have been deliberately chosen and are being proudly pursued. For example, egalitarian values are held in high esteem. Free tuition and generous financial support for almost all students are viewed to be an asset.[71] Efforts are made to ensure a high quality across the whole system and to have high quality higher education and research provision spread all around the country's vast landmass, aligned with the regional spread of the population. In this regard, policies could be said to endorse the view of sustaining a "world-class system" of higher education.

But it is also evident that globalisation is bringing changes which challenge traditional educational practices. Globalisation's biggest effect on higher education has been to transform it from a local institution into one of geo-political significance. Accelerating competition, changes in the global labour market, urbanisation and worldwide pursuit of talent, contributing to world-leading research, and demographic and technological developments will put Finland under increasing pressure. Policy choices are vital to ensure that the country can maintain its successful position vis-à-vis international indicators to ensure Finnish higher education continues to underpin societal objectives.

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[69] For example: J. Davies, T. Weko, L. Kim and E. Thulstrup (2009) *Review of Tertiary Education: Finland*, Paris: OECD; P. Maassen, O. Kallioinen, P. Keränen, M. Penttinen, J. Spaapen, R. Wiedenhofer, J. Mattila and M. Kajaste (2012) *From the Bottom Up. Evaluation of RDI activities of Finnish Universities of Applied Sciences*, Helsinki: FINHEEC; Ministry of Education and Culture (2012) *Education and Research, 2011–2016. A development plan*, Helsinki: Ministry of Education and Culture; J. Niemelä et al. *Evaluation of the Bologna Process Implementation in Finland*, Helsinki: Finnish Higher Education Evaluation Council, 2012 (Publication, No. 6:2012).

[70] B.M. Kehm, J. Huisman and B. Stensaker (eds) (2009) *The European Higher Education Area: Perspectives on a Moving Target*, Rotterdam: Sense; A. Curaij, P. Scott, L. Vlasceanu and L. Wilson (eds.) (2012) *European Higher Education at the Crossroads: Between the Bologna Process and National Reforms*. 2 volumes, Dordrecht: Springer; R. Pricopie, P. Scott, J. Salmi and A. Curaj (eds.) (2015 In press) *Future of Higher Education in Europe*. Dordrecht: Springer.

[71] D. Orr, C. Gwosd and N. Netz (2011) *Social and Economic Conditions of Student Life in Europe*, Bielefeld: W. Bertelsmann.

A.2.2 Policy Challenges

Given this impressive success story, the International Panel identified some challenges for policy which deserve further attention, at the system and individual institutional level.

- Select Centres of Excellence vs. Quality across the Whole System?

There is a mixture of higher education institutions (HEI) – universities and universities of applied sciences – and research organisations operating within the Finnish innovation system. HEIs, within each part of the overall system, have evolved over the years to create a more diversified system. This diversity has created a system providing high quality education and research opportunities and outcomes around the country, from Helsinki to Lapland, with little evidence of inequality of opportunity. Finland's strategy of pursuing a "world class system" diverges from the growing assumption in many countries that in order to pursue success and raise quality, resources should be concentrated in a few "world class universities". What is the appropriate and desirable balance between these different priorities? What policies would best ensure strong regional development while strengthening international competitiveness of the higher education and research system?

- Education and Research for Knowledge vs. Economic Relevance and Impact?

Dramatic changes in the national economy have visibly shaken Finnish self-confidence and raised challenging questions about the country's future. In addition, concerns have been expressed about meeting the needs of a changing demographic profile over a vast geographic expanse, and the best way to build-up and maintain the higher education and research eco-system which are strongly underpinned by traditional academic values. However, is it now appropriate that new priority areas of specialisation in research and teaching are identified? Do students require a different set of competences to cope with the future? Should there be more breadth, more emphasis on key skills, professional problem-solving, entrepreneurial competences, etc.? What further professionalization of the teaching and guidance competencies of the teachers in higher education could be called for?

- Achieving Strong System Coherence vs. Strengthen Institutional Autonomy?

There is a history of strong national coherence as expressed through shared social values which have ensured a deep commitment to equity. At the policy level, recent developments, such as the performance contracts and strategic dialogues have sought to ensure all HEIs meet national objectives. At the same time, new legislation has created expectations that individual universities/universities of applied sciences will become strategic actors and develop clear profiling policies. To what extent has government steering become an important driver of change or a constraint? What is the appropriate balance between centralisation and de-centralisation?

- Bedding-down Higher Education Reforms vs. Pushing Ahead with Further Reforms?

Over the last decade, many new reforms affecting the higher education and research system in Finland have been initiated and pursued. At first glance, there would appear to be a multitude of new reforms that have left little time to implement the changes, to observe their consequences or to draw evidence-based conclusions as to their effectiveness. For example, the new Bachelor degree awarded by universities, under the Bologna reforms, has not yet been widely accepted as a qualification in the labour market creating unintended consequences for educational provision. There are still only tentative signs of closer links being created between independent research centres and universities. What steps need to be taken to ensure greater success?

A.3 Observations and Recommendations

The International Panel has identified the following key issues to ensure the higher education and research system strengthens its contribution to Finnish society, and

that it is future proofed. Other issues are discussed throughout this report. By choice and given time constraints, this review does not cover the whole spectrum of issues facing higher education; this is not to undermine the importance of these other matters.

Key issues:

- Pursuance of a "world class" de-centralised high-quality higher education and research system, providing equality of opportunity to majority of the population and meeting societal needs, should endure.
- Further consolidation of the higher education and research system should continue. This should include increased focus around specialisation, mergers as appropriate including across the binary divide, and taking full account of the importance of balance and equitable regional development.
- Institutional strategic profiling in teaching and research should be strengthened via mechanisms around institutional autonomy, strengthened leadership and decision-making, diversification of funding opportunities, internationalisation, etc.
- Performance contracts and strategic dialogues should be reviewed to ensure that what is being measured is balanced between meeting national objectives and pursuing strengthening institutional profiles.
- Attention must be put on improving transition from secondary to higher education, and student completion rates within the required timeframe. Consideration should be given to incentives, and targeted advice and guidance to students before entry into higher education.
- The university bachelor should be made an attractive degree in its own right and as an entry qualification to the labour market.
- Greater emphasis should be placed on increased flexibility and innovation into higher education provision, providing lifelong learning opportunities for students of all ages who, for career and life-style reasons, seek to re-enter the education system, including those who already hold a Bachelor's or Master's degree.
- The quality of teaching and learning, and improvements in educational innovation, should be more strongly embedded within the educational mission of HEIs, and within national objectives, placing emphasis on the development of general, transferrable or keys skills, and on compulsory pedagogical training of teaching staff.
- Curricula reforms should be undertaken to include "general" or "transferrable" skills in order to provide broader competencies, encouraging creativity and entrepreneurial attitudes, and enabling greater flexibility in learning pathways within and between institutions, including between universities and universities of applied sciences.
- Promotion of open-access intellectual property rights (IPR) should be considered as the way to strengthen the transfer and translation of knowledge.
- Adoption of a framework for enhancing internationalisation that goes beyond mobility should be endorsed.

A.4 Configuration of the Finnish Higher Education System

The last decades have witnessed a transformation in the role, scale and expectations of higher education worldwide. Rather than universities attended by a small social elite, post-secondary attendance is now seen as essential by the greater majority of people and for society. In response to demographic and labour market demands and global developments, governments around the world, in different ways, have been looking at

the capacity and capability of their various HEIs, and the system-as-a-whole, to meet the needs of society and the economy into the future.

The Finnish higher education and research landscape is comprised of 14 universities (with 168,000 students), 24 universities of applied sciences (with 148,000 students), and 13 research institutions. The overall configuration of the higher education system in Finland can be described as having the following characteristics: a high degree of completeness; a magnitude of institutions; a flat prestige hierarchy; a wide regional dispersion; a limited emphasis on specific institutional profiles; a limited "division of labour" between institutions; and a binary system as the major formal diversification.

A.4.1 Completeness vs. Selectivity

Most reports on higher education and research in Finland – no matter whether the authors are Finnish or foreign experts – take for granted that the context is world-wide or "global" and that the supra-institutional frame of reference and the key actor is the nation, i.e. in this case Finland. Hardly any reflection focuses on the situation of higher education and research in Etelä-Suomi or in Lappi on the world map, and hardly any report talks about the position and the joint action of Nordic countries. This is not only true for countries with a relatively small population and for countries with a strong national power. We also seldom find discussions on the situation of higher education and research in the Canton Zürich or in North-Rhine Westphalia on the world map, even though the population size of the latter is more than four times that of Finland. And this emphasis on nations implicitly suggests that national systems ought to be complete: All major disciplines and thematic areas of study programmes and research should be present on a qualitative desirable level and quantitatively acceptable scale.

There are discussions, however, that countries with a relatively small population cannot succeed in stimulating and supporting costly research in all areas on a level that everywhere research is viewed as "strong". The International Panel notes it is taken for granted in Finland that some areas of research have become strong over time and are likely to remain strong as a consequence of the research promotion policies which tend to reinforce established strengths to a certain extent. There are some research priorities based on cultural and geographic specifics, e.g. "Arctic" research and the culture of the Lapps. Moreover, it has been strongly emphasized that research should reflect the economic and industrial structure of Finland.

As regards the future, the International Panel notes with interest that it did not observe any major debates around national selectivity or prioritisation within the broader regional framework; in other words, there was hardly any reference to a possible Nordic division of labour. Likewise, it was noticeable that the current configuration of the system is considered relatively "complete" and that there was no advocacy for unitary system as a result of generalised mergers between universities and universities of applied sciences or for high selectivity in areas of research and teaching. At the same time, it seems to be almost taken for granted that emerging strengths and weaknesses will lead automatically to greater selectivity, that short-term development reports and recommendations produce useful results, that Finnish scholars are sufficiently embedded in international forward-look activities of research to identify and get involved in newly emerging areas, and that the existing systems of communication between the academic world and the economy lead to a realistic mix of breadth of skills and expertise. Conversely, there is no confidence that long-term forecasting of research or of economic and social needs will provide proper guidance for the development of higher education and research in Finland.

A.4.2 Magnitude of Institutions

The number of institutions of higher education relative to the population size was exceptionally high in Finland about a decade ago. In recent years, there have already been several mergers both in the university and university of applied sciences sector and further mergers are under way. These voluntary developments have significant merit and have high acceptance amongst the various stakeholders. Currently, the view

is widespread in Finland that the number of institutions still is relatively high and that some additional mergers would be desirable. The International Panel got the impression that advocates of mergers in higher education and research in Finland primarily hope to create more strategic and efficient management. Examples were named here and there that new intra-institutional areas of cooperation in teaching and research might happen. On the other hand, mergers were not advocated on the ground that resources for teaching and research should be concentrated in fewer places.

The International Panel was not presented with strong arguments either in favour of or against the strengths and weaknesses of mergers or the likely impact such changes would have – intended and unintended – on the scale, educational provision or organisation structure of the newly merged institutions. Rather, mergers seem to be advocated in Finland primarily in the hope of valuable cross-fertilisation through linkages across the hitherto existing formal sectors of universities, university of applied sciences, and public research institutes outside higher education.

But, geographically Finland is a large country and – in line with the democratic educational system – potential mergers should not jeopardize regional equality. Focus should be on forming strategic, innovative and profiled partnerships not simply to create larger units for the sake of "bigger is better". Mergers should add value to the role and responsibilities of the participating HEIs, especially with respect to improving the quality of teaching and learning, and research, and not simply aimed at improving efficiency through the creation of joint administrative structures.[72]

Thus, it could be argued that formal mergers are a desirable target *if* significant added-value from, inter alia, enhanced cross-fertilization, strengthened educational programming and research, stronger regional engagement, learning pathways and educational/career opportunities, internationalisation, etc. is likely to emerge from the consortia of institutions. Hence, the rationale should be clearly defined and agreed prior to merger. Where such evidence is available, the institutions should receive resolute support, including the removal of legislative impediments.

A.4.3 Concentrated Hierarchical (Vertical) Differentiation vs. Decentralised Flat (Horizontal) Differentiation

At first glance, the strong attention paid internationally to "rankings" and lists of "world-class universities" suggests that the future of national higher education systems clearly lies in a high concentration of personnel and material resources at a few "excellent" universities.[73] Indeed, many reports would suggest that there is a convergent trend around the world in this direction. A closer analysis shows that increasing international visibility and attractiveness is important for institutions and the country. Accordingly, the rise of University of Helsinki, by even a few steps in the most popular rankings, would potentially have significant spill-over effects for Finland with respect to mobile talent, professionals and capital. However, the International Panel did not note any strong advocacy for the substantial concentration of resources and the best academic talents at a few institutions at the expense of a solid quality spread over all the country similar to the regional spread of population. Indeed, the regional spread of higher education and research is viewed in Finland as an overall strength: beneficial for the economy, for social wellbeing, for cultural richness and, as a consequence, for continuous attractiveness of the various regions and, thus also, for sustaining life outside metropolitan areas.

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[72] J. Ursin, H. Aittola, C. Henderson and J. Välimaa (2010) "Is education getting lost in university mergers?" *Tertiary Education and Management*, 16 (4)327–340.

[73] E. Hazelkorn (2011, 2nd ed. 2015 In Press) *Rankings and the Reshaping of Higher Education. The Battle for World-Class Excellence*, Basingstoke: Palgrave MacMillan; B.M. Kehm and B. Stensaker, B. (eds.) (2009) *University Rankings, Diversity and the Landscape of Higher Education*, Rotterdam and Taipei: Sense; J.C. Shin and B.M. Kehm (eds.) (2013) *Institutionalization of World-Class University in Global Competition*. Dordrecht: Springer.

The International Panel does not see any necessity or rationale for challenging this Finnish option. In fact, the evidence claimed by advocates of highly-stratified, vertically-hierarchical higher education systems – that such solutions are academically superior – could actually lead to unintended consequences, including undermining national economic capacity and widening the privilege gap thereby threatening other cities and regions. Consolidating funding to support top-tier, world-class universities may also destabilize high-quality research being made by a wider set of higher education institutions which are doing good work in niche areas.[74] Ultimately, there is no evidence that more concentrated national systems generate higher citation impact than those in which output is more evenly distributed.[75]

It is also not true that more or less all other countries opt for highly stratified systems; Ireland and Norway have openly avoided such options. Even cases such as the often named German Excellence Initiative are financially relatively small reallocations to the desired top combined with the strong conviction that a solid quality of higher education and research across all regions should not be sacrificed. Last but not least, Finnish higher education and research seems to be so successful according to many indicators employed in the international discourse that external observers could hardly call for dramatic reversals.

Various countries favouring a prestige hierarchy among universities had opted in the past for a two-type and a multi-type system of higher education as a form of diversification during the process of higher education expansion. The Finnish university-university of applied sciences structure is one of these examples. As in Finland, many countries with binary systems are now engaged in a discussion about the on-going efficacy of such strict institutional and functional segmentation in the face of continuing evolution of higher education systems and institutions in response to broader and global changes.[76]

The International Panel found broad support for the binary system. It is seen by policymakers, higher education leaders, business and policy stakeholders, and students to work well and to provide a wide range of educational opportunities which meet labour market needs. While distinctions between types of institutions have blurred over the past decades, there is continuing strong support that the future Finland should have higher education institutions with different missions and functions. Nonetheless, it may now be the appropriate time to re-consider collaborations between universities and university of applied sciences.[77] Internationally there are examples of enhanced collaboration and mergers between universities and more professionally oriented HEIs, creating dual-sector institutions,[78] which provide a breadth and depth of educational and learning pathways as well as benefiting from a more integrated curriculum and research platform.

A.4.4 Limited vs. Articulate Institutional Profile and "Division of Labour"

The Finnish universities and university of applied sciences are not uniform. The International Panel observed a diversity of traditions and priorities, local and regional characteristics, in some instances language preferences, ranges of disciplines and

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[74] D. W Chapman, C.-L Chien, P. Haddawy, G. Halevi, S. Hassan, I.B.Lee, H.F. Moed, P. Montjourides, M. Schaaper, S. Sigdel and N.V. Vafghese (2014) *Higher Education in Asia: Expanding Out, Expanding Up. The rise of graduate education and university research*, Montreal: UNESCO Institute of Statistics, p13.

[75] H.F. Moed (2006) *Bibliometric Rankings of World Universities*, Leiden: CWTS, University of Leiden.

[76] J. Taylor, J. Brites Ferreira, M. de Lourdes Machado and R. Santiago (eds.) (2008) *Non-University Higher Education in Europe*, Dordrecht: Springer.

[77] S. Kyvik and B. Stensaker (2013) "Factors affecting the decision to merge: The case of strategic mergers in Norwegian higher education", *Tertiary Education and Management*, 19 (4)323-337.

[78] G. Moodie (2010) "Mixed-sector tertiary education: implications for self-accrediting and other higher education institutions", National Centre for Vocational Education Research (NCVER), Canberra: Department of Education, Employment and Workplace Relations. http://files.eric.ed.gov/fulltext/ED514722.pdf.

study programmes, strengths of research areas, etc. To a certain extent, there is sufficient support in Finland for separate laws as a legal basis and differentiator between the two types of institutions; indeed, there was no suggestion supporting the removal of this distinction. Nonetheless, there was a strong view that the "visible hand" of government and a high emphasis on equality may have reinforced a high degree of similarity in many respects between the universities, and between the universities of applied sciences. Furthermore, the reform of university/ university of applied sciences legislation was appreciated not because of its endorsement of "institutional autonomy" but because it opens the opportunity to move towards greater "horizontal diversity".[79]

Both universities and university of applied sciences are supposed to make more targeted strategic decisions in order to create more specific profiles about their teaching and research activities. However, the International Panel came to the conclusion that the legislative reform has been less effective as a catalyst of change than might have been expected or anticipated. Reasons named include, inter alia, the speed of new policy initiatives and the continuously strong "visible hand" of government in the steering of the higher education and research system. For example, the detailed funding formula and contracts between government and individual universities might discourage the search for individual institutional profiles. Moreover, the financial constraints in recent years have not facilitated new priority decision-making or risk taking.

As a consequence, it was not surprising to hear that a "division of labour" between universities is being advocated. Most notably, the universities are beginning to work together to agree on concentrations across a small set of study fields. These might result in some study fields being available at only three universities rather than everywhere. This action would be promising although such coordination might be more complicated today than a decade ago because the universities have also more autonomy to evade coordination. More importantly, reducing the spectrum of study fields does not in-itself constitute an "institution with a profile". More creative and strategic thinking is required to establish a strong identity around a breadth of functions for each university on the one hand and the comparative advantages derived from competitive expertise on the other.

There are also several examples of collaboration between universities and universities of applied sciences in Finland (for example, in Lappeenranta, Rovaniemi and Tampere regions). These collaborations – which have arisen on a voluntary basis – provide opportunities for students to take educational courses drawn from both institutions, to strengthen research expertise and develop new collaborations, and to make a stronger regional impact. Collaborations between universities and universities of applied sciences should also consider ways in which facilities can be shared, and rational rationalisation alongside new educational programming can be developed in the fields that exist within both institutions. This could open up opportunities to increase effectiveness while improving quality. Furthermore, educational collaboration could lead to new pedagogical innovations and ways of learning (see also the section on teaching and learning).

The Ministry of Education and Culture has emphasized "quality" and "efficiency" as mid-term policies for higher education. This scenario may please the universities and the academics, because they like to emphasize "quality" as the criterion closest to the identity of the university, and because they might accept the "efficiency" criterion as indispensable. The criterion of "relevance" or "societal/regional impact" is not referenced although it is both more challenging and promising. Finnish universities

[79] U. Teichler (2008) "Diversification? Trends and Explanations of the Shape and Size of Higher Education", *Higher Education*, 56(3), 349-379; J. Huisman (2009) "The Bologna Process Towards 2020: Institutional Diversification or Convergence", in B.M. Kehm, J. Huisman and B. Stensaker (eds), *The European Higher Education Area: Perspectives on a Moving Target*. Rotterdam: Sense, pp245-262.

and universities of applied sciences should strive to develop more substantive and unique profiles by embracing the concept of "smart specialisation" for institutions.

A.5 System Steering and Governance Arrangements

Over recent years, a series of new legislative reforms for the universities (2010) and for the universities of applied sciences (2015) have been introduced with the intention of steering the system towards greater effectiveness and enhanced efficiency. Additional actions have been taken to strengthen the Finnish research and innovation system through enhanced co-operation between universities and research institutes, development of research consortia, and the establishment of the Strategic Research Council as an investment funding instrument.

The Finnish government aims to ensure that by 2020, the higher education system will provide higher quality education, and be more international and efficient than it is today. Accordingly, the government has sought to link resource allocation to performance. It has adopted a programme of institutional contracts and strategic dialogues between the Ministry of Education and Culture and individual institutions. Profile mapping has been developed to encourage greater institutional distinctiveness. Thus, by moving from a simple top-down to a more iterative and strategic process, it is intended that the over-all objectives of the system-as-a-whole can be more fully developed, and the system will be strengthened to meet domestic and international challenges. Similar trends are in place in Ireland, Australia, Denmark, Norway, Germany, the Netherlands, Italy, Portugal, Sweden and Ontario, Canada, amongst others.[80]

It is not clear, however, how well this process is actually working. Concern was expressed, and acknowledged by International Panel, that the system could be experiencing reform over-load, and that it lacked the absorptive capacity to respond to and embed each set of reforms before the next set is introduced. The views expressed may represent genuine reform fatigue or they could be an expression of complacency. In either case, this is potentially a cause of concern, as it appears that recent economic developments have exposed a fault-line, and that the success of Nokia effectively replaced the necessity for the higher education and research system, at the institutional and system level, to develop strategic or foresight capacity and capability, to understand the changing dynamics of the national and global labour market, and to develop stronger resilience to global changes. The absence of a whole-of-government approach, as well as disparate and conflicting views between different ministries, gives the impression of a system which is bewildered and standing-back, waiting for directions.

A.5.1 Performance Contracts and Strategic Capacity

The resource allocation models between the Ministry of Education and Culture and the universities and universities of applied sciences constitute powerful steering mechanisms. The resource models highlights the different profiles of universities and universities of applied sciences; for example, 85% of funding for universities of applied sciences derives from education while in the universities 41% is devoted to education

[80] T. Esterman, E. Bennetot Pruvot and A-L. Laeys-Kulik (2013) *Designing strategies for efficient funding of higher education in Europe*, Brussels: EUA, http://www.eua.be/Libraries/Publication/DEFINE_final.sflb.ashx; Department of Education (nd) "Mission-based Compacts", Canberra: Australian Government, https://education.gov.au/mission-based-compacts; Ministry of Training, Colleges and Universities (nd) "Transforming Ontario's Postsecondary Education System", Ontario, Canada, http://news.ontario.ca/tcu/en/2014/08/building-a-stronger-postsecondary-education-system.html?utm_source=ondemand&utm_medium=email&utm_campaign=p; M.B. Ziskin, D. Hossler, K. Rabourn, O. Cekic and Y. Hwang (2014) *Outcomes Based Funding: Current Status, Promising Practices and Emerging Trends*, Toronto: Higher Education Quality Council of Ontario, http://heqco.ca/SiteCollectionDocuments/Outcomes-Based%20Funding%20ENG.pdf; HEA (2012) "Towards a Future Higher Education Landscape", Dublin: Higher Education Authority.

and 34% on research. The appropriate choice and balance across different indicators is, however, vital to ensure the overall purpose is achieved. Thus, in addition to specific input/output measures – which are fairly standard – some leeway has been left for strategic development opportunities of individual HEIs.

Great care should be taken to ensure that the choice of indicators does not result in a perversion of activity around a minimum set of actions. Indicators should be aligned with broad objectives for research, teaching and learning, and regional engagement (see further discussion below). It is inevitable that the overwhelming majority of the indicators are focused on education and research/RDI outcomes, but leaving only 10% for the universities and 2.5% for the universities of applied sciences for strategic development may be inadequate to encourage any real strategic development or distinctive profiling. If the aim is to encourage greater institutional strategic capacity and capability and to improve institutional distinctiveness and profiling as a means to better position Finnish HEIs internationally – then greater consideration should be given as to how these objectives can be become a more recognizable part of the model. Indeed, it would be appropriate to balance pressure for efficiency and system steering with increasing strategic capacity of individual institutions as evidence by strong(er) institutional profiles. This can be accomplished by modulating the set of indicators, agreeing different weightings for each institution, which could be realized within the contracts between the government and the individual institutions.

Legislative changes have strengthened institutional governance leading to changes within the institutions albeit these were described as relatively minor. On the other hand, concerns were expressed about the lack of sufficient strategic capacity at the both the institutional (universities and universities of applied sciences) and board level to deal with the new dynamics. Thus, consideration should be given to: providing the requisite support for institutional initiatives, which may include leadership and board training and capacity building, and scenario-planning; this should also comprise succession planning.

Enhancing institutional autonomy can also come about by diversifying funding opportunities and generating new source of funding; this is especially important if current financial projects for Finland remain. Thus, all HEIs should be actively encouraged to explore and develop other funding streams, for example through spin-out companies, commercialisation of RDI, professional and business services for the community/region, etc.

A.5.2 Measuring Impact and Societal Contribution

Nowadays, increasing attention is being given not just to what universities are good at but what they are good for. However, under the Finnish model, universities are assessed using very traditional research indicators while the universities of applied sciences are required to meet criteria with respect to "regional impact and links with business and industry" although unspecified. This dualism reflects the binary division of labour but it is inconsistent with growing understanding, across Europe and more widely, that knowledge production is a continuum involving the whole process of discovery, spanning the spectrum from curiosity-driven to use-inspired, from blue-sky to practice-based. This coincides with increasing European focus around "societal challenges" which encourages a multi- and inter-disciplinary and multi-actor teams to mobilize and harness knowledge in order to address societal challenges that transcend institutional or national boundaries.

Instead, the current set of research/RDI indicators reflect i) a strict division between research, development and innovation, and ii) a perception that impact is assessed primarily in terms of peer review rather than social accountability.[81] This will

[81] M. Gibbons, C. Limoges, H. Nowotny, S. Schwartzman, P. Scott, and M. Trow (1994) *The New Production of Knowledge*, London: Sage; Europa (2013) *The Grand Challenge. The Design and Societal Impact of*

encourage universities to remain quite traditional in their approach to education and research (see discussion below) while universities of applied sciences will be restrained in their capacity to develop the appropriate human resource capabilities to undertake RDI at the level required.[82] New thinking should be brought into discussion to strengthen the "public good" role of higher education.[83]

A.5.3 Clusters and Regional Engagement

The concept of regional or discipline clusters was proposed by various participants as a mechanism to bring about greater synergy and collaboration between the various HEIs, between HEIs and enterprise and civil society, and between higher and further education. Some current initiatives include programme, research and resource sharing, and there is support for "clusterisation" between HEIs and stakeholders on a regional basis. At the same time, the university rectors' conference has begun to consider opportunities for greater specialisation. However, other initiatives appear to lack adequate reassurances and support from the policy environment due to legislative restrictions and other system inflexibilities.

In a globalising world, "regional economies" are becoming a key unit of analysis on the international stage today.84 The formation of HE alliances or clusters, including further education, enterprise and civil society, opens up significant opportunities for Finnish higher education helping to leverage the potential of the "quadruple helix".85 Building clusters around well-defined domains of/for specialization can help strengthen higher education, and underpin social, cultural and economic advancement. There is a strong correlation between these initiatives, and smart specialisation and regional policy – often referred to as a space-based approach.86 There are various examples, internationally, of different types of initiatives, some of which are driven by government as part of prestige strategies as in France,87 while others are pursued by the HEIs themselves in recognition of the strategic added-value of collaboration.88 As a group, these arrangements may range from institutional alliances to mergers.

These measures already form part of Finnish government strategies to strengthen regional dimension, but unless these objectives are backed-up by stronger financial and other incentives and support instruments, they will be ignored in favour of those indicators for which funding is attached. While there are sector organisations for the universities and the universities of applied sciences, consideration should be given to creating an all-Finland HE/tertiary education council, which would bring all the key

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Horizon 2020, Brussels: European Commission; A. Rip (2011) "The future of research universities", *Prometheus: Critical Studies in Innovation*, 29:4, 443-453.

82 P. Maassen, O. Kallioinen, P. Keränen, M. Penttinen, J. Spaapen, R. Wiedenhofer, J. Mattila and M. Kajaste (2012) *From the Bottom Up. Evaluation of RDI activities of Finnish Universities of Applied Sciences*, Helsinki: FINEEC.

83 C. Calhoun (2006) "The University and the Public Good", *Theses Eleven*, 87: 7–43.

84 K. Ohmae (1995) *The End of the Nation State: The Rise of Regional Economies, Economic Development and Cultural Change*, London: Harper Collins.

85 OECD (2007) *Higher Education and Regions. Globally Competitive, Locally Engaged*, Paris: OECD.

86 Europa (2010) "Regional Policy contributing to smart growth in Europe 2020", Brussels, COM (2010) 553.final, http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/smart_growth/comm2010_553_en.pdf.

87 A. Sursock (2014) "Mergers and Alliances in France: Incentives, Success Factors and Obstacles", in A. Curaj, L. Georghiou, J.C. Harper and E. Egron-Polak (eds), *Mergers and Alliances in Higher Education: International Practice and Emerging Opportunities*, Dordrecht: Springer, pp23-40.

88 University of Catalonia (ACUP), http://www.acup.cat/en/universitats; J. A. Douglass, R. Edelstein and C. Hoareau (2011) "A Global Talent Magnet: How a San Francisco/Bay Area Higher Education Hub Could Advance California's Comparative Advantage in Attracting International Talent and Further Build US Economic Competitiveness", Research and Occasional Papers Series, Center for Studies in Higher Education, UC Berkeley. http://www.cshe.berkeley.edu/publications/global-talent-magnet-how-san-franciscobay-area-higher-education-hub-could-advance.

stakeholders together to discuss matters of mutual interest and benefit, at the supra-national level.

A.5.4 Profiling and Specialisation

Profiling is a major component of the government's plans for higher education; it is seen as a means to promote institutional or mission diversity in order to meet the breadth of educational and societal requirements. While the universities and universities of applied sciences have evolved and acquired different characteristics over the years, they have not engaged pro-actively with the process of developing distinctive profiles. This reluctance is probably due to a combination of factors: First, HEIs did not previously have their own strategy so they tended to copy what others were doing; thus, each institution simply did the same thing and covered all subjects. Specialisation threatens this, requiring HEIs to give-up some "territory". Second, many regional governments are keen that their local HEI encourages all subjects. Thus, institutional autonomy appears inadequate to underpin strong institutional leadership and face-down opposition from the wider community and from academic staff. In practice, this of course demands strategic leadership from the Boards of HEIs and decisions and actions from the management of the HEIs. Third, being regionally-engaged is too often seen as having a lesser status than being internationally-focused.

What seems evident is that "one model does not fit for all". It is also evident that simply rationalising programmes or "down-sizing" is not equivalent to specialisation or profiling. Thus, further consideration should be given as to how the processes of profiling and specialisation can be re-invigorated. The strategic dialogue process may help to better promote rationale rationalisation, encourage high level specialisation, and distinctive roles and responsibilities of each HEI, as an overall approach in which no one individual institution feels threatened.

A.5.5 Quality and Quality Audits

Internationally, quality assessment is increasingly linked to accountability and performance rather than simply used as a tool for improvement or enhancement.[89] This raises questions about whether the current quality assurance/audit practices, which are process-oriented, are fit-for-purpose. There is, for example, a tendency to consider the process and degree of implementation of the processes as a measure of "quality".[90] Funding models for both universities and universities of applied sciences were recently renewed and any further change should be undertaken with this mind.

Further consideration should therefore be given to embedding systematic benchmarking and peer review, using mission-appropriate quantitative and qualitative indicators, in the strategic dialogue process. At the same time, the universities and universities of applied sciences should be encouraged to develop their own internal resource allocation model appropriate to better support their distinctive profiles and strategic fields rather than simply adopt external model as a basis for internal resource allocation – as appears to be the situation in some institutions.

A.6 Educational Mission

Finland has a global reputation as one of the world's best performing education systems, as demonstrated by high scores in PISA tests with little variation among schools or among pupils of differing family backgrounds. Students who enrol in Finnish universities and universities of applied sciences are obviously well prepared for higher learning. However, given the significant public investment and its strategic

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[89] J. Eaton (2014) "Quality Assurance Now and in the Future: What Needs to Continue and What Needs to Change?" Presentation to the Council of Higher Education, Israel, 14 December 2014; J. Salmi (2015) *Is the Big Brother Watching You? The Evolving Role of the State in Regulating and Conducting Quality Assurance*, Washington, DC: Council for Higher Education Accreditation (CIQG Publication Series).

[90] FINEEC (2013) *Audit of JAMK University of Applied Sciences*, Helsinki: FINEEC.

importance, it is valid to ask what the effects (or added value) higher education has on students' learning and development.

This question is especially relevant considering that education around the world faces a number of changing circumstances.[91] Technology is changing professional and personal lives. These advances pose demands on HEIs to equip graduates with knowledge and skills that will enable them to understand and appreciate the complexities, the interconnectedness and the fast pace of change in our societies. Technology also creates new opportunities for widening access to education and enables new modes of teaching and learning. Demography of student population is changing and more diverse student body in higher education is calling for more creative and individualised approaches in teaching and learning to address their specific expectations and needs.

In this context a number of tensions arise concerning the educational mission: the tension between the demand for individualised, personalised approaches and institutional capacities to provide for mass education; the tension between the assessment of standardized outcomes and the assessment of students' individual achievements; and the tension between institutional performance and institutional quality.[92] These tensions are certainly present also in the Finnish context.

A.6.1 Quality of Teaching and Learning

The measures utilised by the government to promote quality education are primarily indirect measures of learning as a proxy for the quality of education. However, they do not address the fundamental question of how much students actually learn as a result of their experience in higher education and how much their knowledge and skills advance from the entry to higher education until their graduation.

There are several steering mechanisms which focus on institutions' performance in education. The core funding formula is based on the number of degrees granted, which provides an incentive to ensure students graduate and graduate in a timely manner. The number of degrees granted does not measure student learning but achievement, and the two are not equivalent.[93] The score in the national graduate survey (Kandipalaute) is another condition linked directly with funding, and 3% of the core funding is distributed based solely on this criteria. Student satisfaction surveys do not measure student learning but the perceived quality of institutional conditions that are expected to enable learning.[94] Furthermore, when the survey is administered across institutions it is clearly marketed as having an impact on the funding that the institutions will receive from the government. It is therefore in students' interest that their institutional survey rating is high, since this will mean more funding and possibly also added reputation and prestige for their institution. The validity of overall high student satisfaction reported in the national survey is therefore somewhat questionable. The International Panel understands that the Ministry of Education and Culture is considering more direct measures of student learning but these are complex and have not been included in the funding formula.

In the absence of the previous "Centres of Excellence in University Education" initiative, there are no other system-wide instruments that could systematically

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[91] High Level Group on the Modernisation of Higher Education (2014) *Report to the European Commission on New modes of learning and teaching in higher education*, Brussels: European Commission. http://ec.europa.eu/education/library/reports/modernisation-universities_en.pdf.

[92] M. Klemenčič and P. Ashwin (in press) New directions for teaching, learning, and student engagement in the European Higher Education Area, in R. Pricopie, P. Scott, J. Salmi and A. Curaj (eds.) Future of Higher Education in Europe. Dordrecht: Springer.

[93] J.R. Shavelson (2010) *Measuring College Learning Responsibly. Accountability in a New Era*, Stanford, California: Stanford University Press.

[94] M. Klemenčič and I. Chirikov (in press) "On the use of student surveys", in R. Pricopie, P. Scott, J. Salmi and A. Curaj (eds.) *Future of Higher Education in Europe*. Dordrecht: Springer.

stimulate advancements in teaching and learning, and cultivate educational innovation. FINEEC evaluates the quality of the institutional processes not the learning outcomes. The requirement for all teaching staff to obtain training in pedagogy was omitted from the new Law on universities of applied sciences. Hence, pedagogy training is not required across the institutions, and the majority of teachers do not participate even if offered training. As mentioned by one respondents: "We offer truly excellent training in pedagogy, but only very few teachers take advantage of this offer". With competing demands on their time even the most committed teachers have difficulties devoting time to develop courses, experiment with pedagogy and explore possibilities for collaborative and interdisciplinary teaching.

In the meantime, around the world, there has been a push-back from policymakers and the higher education community about the importance of teaching and educational innovation, reacting to the way research seems to have overshadowed teaching and learning.[95] Universities are trying to redefine their teaching and learning approaches based on the growing science of learning, teaching and learning innovation and meeting the educational needs (both pedagogical and technological) of contemporary students.[96] Awareness of the diversity of learning styles and learning expectations of todays' "app generation" students requires more customised educational provision, and technology is often introduced to aid this. In sum, there is no time for complacency when it comes to the advancement of teaching and learning.

A.6.2 Advancing Teaching and Learning

Finland has the potential to be a leader educational innovation. This is due to several factors: i) students have excellent basic competences (due to free and high quality schooling), ii) high interest in pedagogy within the universities of applied sciences, and iii) strong research capacities and strategic priority in the area of "digitalisation". These factors can be employed to "nudge"[97] excellence in teaching and learning across all institutions, and towards global leadership in basic and applied research in this area.

Consideration should be given to including advancement of teaching and learning and educational innovation in the performance contracts. This could be included as part of a broader alignment between the quality audits and performance contracts and the strategic dialogue process. Targeted research funding could be developed in areas of: instructional methods, tools and technologies and learning environments, authentic assessment of student learning and student experience; and student motivation, self-regulation and student engagement. Research projects funded through governmental agencies could be required to demonstrate their intention to link with teaching, for example through involvement of undergraduate students.

Following upon the experience within the universities of applied sciences, consideration should be given to introducing a compulsory certificate, and on-going professional development, in teaching and learning – as is now happening across many countries.[98] Consideration should also be given to enhancing institutional support and incentives via small grants, sabbatical time, criteria in promotion, required pedagogical training, etc. Other initiatives might include intra- and inter-

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[95] High Level Group on the Modernisation of Higher Education (2013) *Report to the European Commission on Improving the quality of teaching and learning in Europe's higher education institutions*, Brussels: European Commission, p7. http://ec.europa.eu/education/library/reports/modernisation_en.pdf

[96] M. Klemenčič and P. Ashwin (in press) *New directions for teaching, learning, and student engagement in the European Higher Education Area,* in R. Pricopie, P. Scott, J. Salmi and A. Curaj (eds.) *Future of Higher Education in Europe*. Dordrecht: Springer.

[97] R.H. Thaler and C.R. Sunstein (2008) *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New Haven, Connecticut: Yale University Press.

[98] For example: National Forum for the Enhancement of Teaching and Learning, Ireland, http://www.teachingandlearning.ie/; Higher Education Academy, UK, https://www.heacademy.ac.uk/

institutional collaboration and sharing of resources, and "proof of concept" type support for educational start-ups.

A.6.3 Curriculum and Programmatic Profiling

The curricular structure in Finland is organised so that students enter directly into a particular discipline and then develop a specialisation within that discipline. The International Panel was told that this approach can lead to fragmentation across the bachelor study programmes, creating many different programme offerings which are narrowly specialised at a time when graduates will change jobs frequently, and work in areas we don't yet know about.

Programmatic profiling should be an integral part of overall institutional profiling. Given relative size of the country, not every university or universities of applied sciences can be a "Stockmann mega store" in terms of programmatic offerings; rather, there should be a greater emphasis on specialisation according to academic expertise, regional requirements and global opportunities. To achieve this, it may be necessary to: i) eliminate unnecessary duplication of degree programmes while ensuring comprehensive provision system-wide; ii) align programme to regional and labour market needs; iii) re-examine internationalisation objectives (see discussion below); and iv) revise the set of indicators so that they encourage improvements in teaching and learning, e.g. percent faculty completing pedagogical training. More broad-based programmes at bachelor level should be considered. Some practical actions may include interdisciplinary "linked courses", "learning clusters" or "coordinated studies".[99] HEIs can promote integrative learning through learning communities.[100]

A.7 Changing Labour Market and Skill Needs

One of the key objectives of the Finnish higher education system is to enhance sustainable economic growth, employment and competitiveness. This economic function of higher education, and its role in meeting the skill needs of the changing labour market, is seen as central to Finland's future. At the same time, the Ministry of Education and Culture recognises the importance of higher education's social and civic responsibilities, for example, in reducing poverty, inequality, and social exclusion. Recognition of, and the promotion of these and other wider public benefits of higher education steer many of Finland's higher education policies. Indeed, the International Panel met with many people who expressed strong support for these support for these social, cultural and civic roles, and some vocal resistance to the commercialisation and commodification of knowledge seen in other European countries.

This is one of the clear strengths of the Finish higher education system and a highly valued distinguishing characteristic. There is no suggestion that these social and economic objectives should change. However, lessons from other European countries suggest that in the future, sustaining a balance may be a challenge, especially in a tight fiscal environment and wider pressures for a more market-oriented system of higher education.

A.7.1 Meeting the Skill Needs of a Changing Labour Market

Higher education participation rates in Finland are high, relative to the OECD average (*Education at a Glance*, 2014). However, there are considerable differences in opinion as to whether high participation rates alone lead to economic growth or meet the skill needs of an economy. Moreover, the extent to which "patterns of educational qualifications match the demand of the employment system is a frequent topic of

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[99] J. A Douglass (forthcoming) *Exploring the Flagship University Model: Altering the Paradigm from Ranking to Relevancy*, Basingstoke: Palgrave Macmillan.

[100] M. Taylor Huber (2006) *Fostering Integrative Learning through the Curriculum*. The Integrative Learning Project, Washington, DC: The Carnegie Foundation for the Advancement of Teaching and the Association of American Colleges and Universities, http://gallery.carnegiefoundation.org/ilp/uploads/curriculum_copy.pdf.

research and policy debate."[101] On the other hand, it is not possible to fully align the number of graduates with corresponding positions or competences acquired during study and job requirements.

Overall, Finland is likely to experience shifts in its economy with a growing service sector, especially in health and social welfare, and a declining manufacturing sector due to the lingering effects of the post-2008 recession. In reality, it is difficult for any government or higher education system to accurately predict future skills needs, especially when an economy and its landscape are changing so dramatically. However, some demand-led manpower planning activities should be conducted in relation to certain sectors of the economy, e.g. health and social welfare keeping in mind the impact of changes in technology.

Graduate unemployment rates are increasing and are likely to limit options for increasing higher education participation rates – yet, these rates remain lower than those of peers with lower levels of education, and are lower than OECD and EU averages. Accordingly, the International Panel noted the quality of graduates was largely praised and there was limited concern among witnesses about graduate unemployment, with the exception of the Ministry of Education and Culture. Nor were major concerns expressed about: skill or labour shortages, a mismatch of skills or graduate under-employment. However, employers did note some skill shortages in terms of broad competencies which are coming to the fore with the increase in globalisation.

The International Panel noted that no-one raised any issue about lifelong learning and continuing adult education; indeed, remarkably, the topic did not emerge during the discussion except in response to prompting. There are some examples of continuing education at Finnish HEIs and Master's programmes at universities of applied sciences are provided as programmes of continuing professional education. However, taking cognisance of continuing moves towards a knowledge-intensive economy, if skills shortages or mismatches of skills are, or become, a pressing issue much greater consideration will need to be given to enhancing the opportunities for the existing labour force to re-skill and/or up-skill. Indeed, foresight planning in this regard would be highly recommended.[102]

A.7.2 Delayed Entry into Higher Education, Duration of Study, and Completion Rates

The Bachelor's degree is undervalued by employers in the labour market and as a consequence university students opt for the Master's degree, thus prolonging their duration of study. Indeed, it could be said that the single biggest failure of the Bologna reform has been the inability to make bachelor programmes a degree valued in its own right.[103]

The main problem with delayed graduation is its cost and the ensuing financial burden it places upon the Finnish higher education system. Three main issues are associated with this delay. First, students take longer than average to graduate from Finnish universities when compared with graduates from other universities in OECD countries. Second, the population is aging and there is a falling ratio in the working to the non-working population and a growing "care ratio".[104] One way to meet the resulting fiscal burden, is to increase the length of the average graduates' working life

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[101] U. Teichler (2009) Higher Education and the World of Work: Conceptual Frameworks, Comparative Perspectives, Empirical Findings, Rotterdam: Sense Publishers, p27.

[102] M. Knust and A. Hanft (eds.) (2009) Continuing Higher Education and Lifelong Learning: An International Comparative Study on Structures, Organisation and Provisions, Dordrecht: Springer.

[103] Eurydice (ed.) (2010) Focus on Higher Education in Europe 2010 – The Impact of the Bologna Process, Brussels: Eurydice.

[104] Ministry of Education and Culture (2012) *Education and Research 2011–2016: A development plan*, Helsinki.

by bringing young people into the labour market earlier. Third, for Finland to remain competitive within the EU, it is considered important to shorten the duration of studies. This might involve action in relation to:

- Reducing the length of time for transition from secondary schooling into higher education;
- Reducing the duration of study once students commence their studies, particularly for university students as distinct from those attending universities of applied sciences; and
- Improving completion rates.

Numerous policies have been introduced to shorten the average time to completion but with limited success. The International Pane agree that moderate prolongation of study – for the purposes of part-time work, family duties, work experience, somewhat slower pace, work-life balance, civic engagement etc., - is acceptable but substantial prolongation should be penalized.

A.7.3 Delayed Entry into Higher Education, and Transitions from Secondary Schooling

Transition from high school into military service, and from military service into higher education, can contribute to deferred entry. The operation of university admission tests and the admission process can also lead to delayed starts.

The government has introduced a more centralised on-line admission process to try and speed up admissions and initial entry into higher education. The International Panel noted that the new system may need to be monitored closely to ensure no unintended consequences. Will it lead to greater efficiencies in terms of student choice and higher education entry? Or will it lead to greater drop out or more course changes as students opt for their second or third choice rather than first choice of higher education institution and course of study? And how will higher education institutions react to these changes? Have they the capacity to deal with on-line applications? Will universities and courses which have an excess of demand only offer a place to those students who put down their university/course as their first choice?

A.7.4 Duration of Study Once Students Commence their Higher Education Studies

Prolonged study duration is a bigger issue for university students than for those attending universities of applied sciences due to the vocational focus of the latter programmes; there are also variations depending on socio-economic status. Transfers from universities of applied sciences to universities, at first degree level, can also extend study time because of the way in which individual universities assess suitability of universities of applied sciences' programmes. Other factors include: students undertaking paid work while studying; students taking time out for military service and/or family formation; a lack of motivation and integration into university life or conversely, a desire to learn for as long as possible.

Combining studies with paid employment is a distinctive characteristic of the Finnish higher education culture and important for students' integration into the labour market.[105] Finland is not exceptional in terms of delays in the degree-earning process, and there are notable benefits. For many students, this work experience leads to graduate employment. Just under a half of the Finnish university graduates and a third in university of applies science graduates continue in the job where they worked

[105] H. Schomburg and U. Teichler (2006) Higher Education and Graduate Employment in Europe: Results of Graduate Surveys from Twelve Countries, Dordrecht: Springer; J. Allen and R. van der Velden (eds.) (2011) The Flexible Professional in the Knowledge Society: New Challenges for Higher Education, Dordrecht: Springer.

while studying – far higher proportions than in comparable countries.[106] Shortening it could affect engagement in exchange years abroad, transfer from universities of applied sciences to universities or smoother transitions from higher education into the labour market. Indeed, the way in which the higher education system and labour market interact have a direct impact on study time and suggest that some reasons for study delays lay outside the domain of higher education policy.

It should be noted that any change introduced is likely to impact on aspects of the current student experience, e.g. arising from the re-organisation of higher education institutions; implementation of funding and financial incentives; and information and support for students. These effects will require further consideration and monitoring.

A.7.5 Non-completion and Drop-Out

A key challenge is assessing which students have transferred to another institution or switched programmes and subject of study, and which students have "stopped out" rather than "dropped out" altogether. OECD data suggests that Finland's non-completion rate has fallen slightly since 2008 and remains below the OECD average. However, non-completion suggests a waste of public resources especially in those countries where there is limited or no financial returns to partially completed higher education qualifications.

Existing research on non-completion from other European countries suggests it varies considerably by students' demographic and socio-economic characteristics,[107] and tends to be higher amongst students from low-income backgrounds even when prior academic attainment is taken into consideration. Moreover, students are most likely to drop out in their first year of study, suggesting the importance of their first year experiences. Yet, no comprehensive data was presented about which Finnish student groups are particularly vulnerable to non-completion or when drop-out is most likely to occur.

Much of the research on improving student completion and success points to the role of the higher education institution. Tinto proposed that the strength of a students' social and academic integration affects the likelihood of a student remaining in their institution or study programme and successfully completing their studies.[108] In particular, exchanges with academics and peers give students the chance to internalize social and academic values and to integrate into the academic and social communities of their higher education institution. These ideas have informed subsequent research highlighting the importance of institutional commitment to eradicating non-completion alongside institutional commitment to student engagement and belonging (see section on Educational Mission). Thomas, in a UK context, suggests "The commitment to a culture of belonging should be explicit through institutional leadership in internal and external discourses and documentation such as the strategic plan, website, prospectus and all policies."[109] According to her recommendations, the early development of student engagement, the monitoring of students' behaviour and

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[106] S. Merenluoto and M. Lindberg (2012) "The problems with prolonging studies and delaying: The beginning of graduates' working careers from the Finnish national and international perspectives", in S. Ahola and D. Hoffman (eds) *Higher education research in Finland. Emerging Structures and Contemporary Issues*, Finnish Institute for Educational Research, University of Jyväskylä.

[107] See for example the forthcoming report, *Drop-out and completion in higher education in Europe (HEDOC)*, Brussels: European Commission.

[108] V. Tinto (1975) "Dropout from Higher Education: A Theoretical Synthesis of Recent Research," *Review of Educational Research*. 45:89–125; V. Tinto (2006) "Research and Practice of Student Retention: What Next?", *Journal of College Student Retention: Research, Theory and Practice* 8 (1): 1–19; V. Tinto (2007) *Taking student retention seriously*, New York: Syracuse University.

[109] L. Thomas (2012) *Building student engagement and belonging in Higher Education at a time of change: Final report from the What Works? Student Retention and Success programme*, York: Higher Education Academy, http://www-new2.heacademy.ac.uk/assets/documents/what-works-student-retention/What_works_final_report.pdf, p10.

progress, and a holistic approach to the institutions' engagement with study success, are important steps in building a culture of belonging at the institutional level (see discussion above on teaching and learning). Thus, more emphasis should be placed on the students' first year of study and improving their experience. Responsibility for this, however, seemed to lay with the student unions within their institutions rather with their staff.

A.8 Innovation and Entrepreneurship

From the economic perspective, the Finnish higher education system has a good reputation and is known to perform well on its core functions to generate highly educated and skilled workforce resources for the existing labour market. However, as the financing of the welfare state is ultimately based upon wealth generated by society and the economy as a whole (the public, private and third sector), the higher education system is underperforming on two inter-related ways: i) ability to contribute to innovations based on return-on-R&D investments; ii) generating higher percentage of job creators from overall graduates, e.g. high performance start-ups (HPSU). Underperformance in these areas is also a broader issue at the EU level when compared to USA.

The speed by which technology-related innovations can be scaled and matured is accelerating. This is altering the overall landscape of innovation, accelerating the pace of change from technology-driven innovation to much broader understanding and use of innovation. Innovation is created in all areas, and includes technological, social and frugal innovation. Technology is often simply the enabler making the innovation possible and further helping to scale it for international and societal impact. Some global examples of non-technology innovations include: Facebook which is a social innovation or Über which is a model innovation based on service design practises.

Megatrends indicate that large companies are moving towards open innovation, co-innovation and buying validated innovation. This means they are making fewer investments to internal market validation efforts, which means that more innovation is happening via new companies. This opens the opportunity for Finland to create new jobs via scalable validated innovations by growing R&D-led companies for global markets from the start-up phase. However, the efficiency that comes from technology-based innovations is killing jobs at an accelerating pace.[110] A recent study has shown that over the last 25 years, almost all private sector jobs have been created by businesses less than five years old, while at the same time companies more than five years old destroyed more jobs than they created in all but eight of those years.[111]

For a small country like Finland, the logical action is to contribute towards the innovation and skills required for future. Improving upon these dimensions can have high impact for creating jobs and funding the Finnish welfare state into the future. This is an area where higher education can make a huge contribution. To better drive and demonstrate higher education's role and contribution, a more sophisticated way to measure RDI should be adopted, ensuring that it captures output, impact and

[110] A. Smith and J. Anderson (2014) *AI, Robotics, and the Future of Jobs*, Washington, DC: Pew Research Centre, http://www.pewinternet.org/2014/08/06/future-of-jobs/; V. Wadhwa (2014) *We're heading into a jobless future, no matter what the government does*, http://wadhwa.com/2014/07/21/were-heading-into-a-jobless-future-no-matter-what-the-government-does/.

[111] J. Wiens and C. Jackson (2014) *The Importance of Young Firms for Economic Growth*, Kansas City, Mo: Kauffman Foundation, http://www.kauffman.org/what-we-do/resources/entrepreneurship-policy-digest/the-importance-of-young-firms-for-economic-growth.

benefit appropriately across all disciplines, as recommended by an EU Expert Group.[112]

A.8.1 Innovation

Some reasons why Finland is underperforming in research-based innovation stems from the fact that the research is not widely known or accessible to entrepreneurs and smaller companies; intellectual property rights (IPR) release models are not streamlined or are too complex and expensive; and the innovation process is not as fully understood and thus not systematically applied and measured. These bottlenecks are often hampered by a lack of clarity around government responsibilities, between the Ministry of Education and Culture, and the Ministry of Employment and the Economy, when then reflected in structures under these ministries.

To improve access to publicly-funded R&D, efforts should be made to establish clear links between researcher and business, to make IPR more accessible to new companies and to find interesting new innovations by combining multiple interesting R&D findings. With equity crowdfunding, ownership opportunities are becoming more widely available as less capital is required. Thus, actions might include: creating a national policy for access to public-funded IPR, and developing an innovation fund specifically targeted at young researchers.

A.8.2 Entrepreneurship

Culturally and traditionally in Finland, becoming an entrepreneur has not been considered a preferred career path, specifically for higher education graduates. However since 2006, there has been a growing momentum and change in attitude amongst the younger generation towards the entrepreneurship and especially for HPSUs. While this change is positive, especially around improving the profile of entrepreneurship as a career option, there has been quite modest success.

The key lesson is to start educating people earlier about alternative career paths, becoming the creator of employment rather than simply the employee, and the investor in innovations; it is also about understanding risk. To provide quality entrepreneurial education, it is important to distinguish between types of entrepreneurship (e.g. single entrepreneur business and HPSU), and to educate and support different types with appropriate approaches. It is also important to understand that entrepreneurship is much more that simply business education. While general business education is about running a business that either already exists or creating a new business within an existing business model, the true entrepreneurship is more about building something new from nothing. This is especially true for new innovation-based entrepreneurship, which is often building an unknown model to an unknown market.[113] A key factor about these HPSUs is that they are focused on growth as their primary function and as such they are constantly changing.

A broadly-based education programme has implications for teaching and learning, and the curriculum, as discussed above.[114] The experience of Aalto University,[115] combining business, art and technology, provides a good model for encouraging students from different interests to work creatively and collaboratively together, and with companies,

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[112] Europa (2010) *Assessing Europe's University-based Research*, Report of the Expert Group on University-based Research, Brussels: European Commission, http://ec.europa.eu/research/science-society/document_library/pdf_06/assessing-europe-university-based-research_en.pdf.

[113] The Lean Start-Up, http://theleanstartup.com/.

[114] D. Baer (2015) "Scientists have discovered a personality difference between entrepreneurs and employees", Business *Insider*, http://uk.businessinsider.com/personality-difference-between-entrepreneurs-and-employees-2015-2?r=US.

[115] See http://www.aalto.fi/en/; http://www.aalto.fi/en/cooperation/research_and_teaching/entrepreneurship/.

as well as creating new companies as part of their studies. Another great example is Tiimiakatemia, the award-winning entrepreneurship centre of excellence of the Jyväskylä University of Applied Sciences, where student teams operate as independent cooperative companies undertaking real-life projects, which they identify themselves and cover all expenses; 42% of graduates have started their own company three years after graduation.[116] These approaches have significant implications for lifelong learning, and for people wishing to change career.

There are important lessons for HEIs, and their leadership and governance structure. Engagement is often seen as a "third pillar" for higher education, in addition to teaching and research. However, rather than seeing this activity as something separate, there is a need for higher education to more actively engage with business and enterprise, and civil society, and to embed engagement in a more holistic way. The best way is to consider engagement as the horizontal link between teaching and research.[117] Legislation already requires board members to be external to the institution, and with international and societal expertise. Depending upon institutional mission and strategy, action should be taken to identify the most appropriate representation across these categories in order to provide robust strategic advice.

A.9 Strengthening Internationalisation

Promoting greater internationalisation is high on the agenda for higher education and research in most countries worldwide. Thus, any review of the state of Finnish system must be seen in an international comparative perspective. But, measuring internationalisation with the help of readily available statistics and indicators provides very limited insight; it is generally based on a small set of dimensions and conceptually questionable indicators. This hold true, for example, for the university rankings which focus primarily on the rate of foreign students and faculty.[118] Based on these two indicators, internationality of higher education and research in Finland seems to be relatively low. As internationalism is so high on the agenda in Finland and there are strenuous efforts to be successful internationally, the International Panel would have expected a more determined critique of the status quo and strong efforts of redress. However, while Finnish actors and experts favour an increase in the number of foreign students and academics, little concern was expressed about the overall low level.

There is some doubt, however, that the indicators used to measure internationalisation provide valuable insight. Methodological studies on student mobility have pointed out that the most widely published statistics refer primarily to *foreign* students, even though many foreign students in European countries lived and learned in the country of study already before they enrolled (the "foreign mobile" students would be the appropriate target group of analysis). Moreover, the international agencies active in the collection of educational statistics aim at providing information only on foreign students studying a long time or the whole degree programme abroad, thus deliberately excluding temporary mobile students, i.e. the kind of intra-European mobility which is primarily promoted, e.g. by ERASMUS and

[116] See TEAM programme at JAMK, http://tiimiakatemia.fi/en/

[117] J.-G. Mora, A. Detmer and M.-J. Vieira (eds.) (2010) *Good Practices in University-Enterprise Relationships GOODUEP*, Valencia: Valencia University of Technology; E. Ward and E. Hazelkorn (2012) "Engaging with the Community", In S. Bergan, E. Egron-Polak , J. Kohler, L. Purser and M. Vukasović (eds.) *Handbook on Leadership and Governance in Higher Education*, Stuttgart: Raabe Verlag.

[118] J.C. Shin, K. Toutkoushian and U. Teichler (eds.) (2011) *University Rankings: Theoretical Basis, Methodology, and Impacts on Global Higher Education*. Dordrecht: Springer.

the Bologna Process.[119] Moreover, methodological studies on researchers' statistics have called most of the data into question, whereby only the proportion of doctoral awards abroad is viewed as clear exception as a somewhat trustworthy figure).[120]

It is even more important in this context to reflect the underlying policy objectives. The European governments cooperating in the Bologna Process agreed in the Leuven Communiqué of 2009, that the most important long-term target is to increase the proportion of young persons who had experience of at least one other country during the course of their study, whereby a target of 20% on average of European countries was advocated for the year 2020. This means: Making your own population internationally experienced and versatile is the highest goal of student mobility, whereas accommodation of degree students from other countries might be a goal of diverse political relevance across countries. It is worth noting in this context, Finland does look deplorable as regards the Leuven criterion.

The discourse on the value of the rate of foreign academics for the hosting countries is controversial. They are political controversies as regards the desirability of what is called euphemistically "brain gain" and the ethics around national policies which effectively operate at the expense of poorer countries. There are substantially diverse modes of registering and defining persons as "foreign", and statistics on the mobility of academics over their life-course are weak. International Panel was told that mobility of Finnish scholars during the doctoral and post-doctoral phases might be the most relevant criterion.

As regards both long-term mobility of students and long-term or permanent professional mobility, conditions vary dramatically by country. For example, there are enormously high rates of inward mobility to English-speaking countries. Close traditional and cultural ties between some countries may generate high mobility although it is simply a visit amongst neighbours rather than a transgression of a barrier. This hold true for the high inflow of Germans and French to Switzerland, the mobility between Belgium and is respective joint-language neighbours or between Ireland and United Kingdom. Finland might raise the number of study programmes in the English language and increase the financial attractiveness for scholars from other countries, but the view is widespread in Finland and convincing for any external observer that other efforts are more promising.

Looking at the expert literature, the International Panel notes that mobility is just one and possibly a relatively primitive measure of internationalisation. Rapid transfer of knowledge across countries, collaboration in academic work, study programmes shaped by "internationality at home", foreign language proficiency, international communication and networks of academics, knowledge of other cultures and societies, international understanding and global awareness are more salient.[121] Mobility might be the means of supporting such objectives, but the influence of mobility is not dominant; rather it may be substituted by other factors and might lose strength in the future.

A comparative study of the academic profession (2007) show that internationalisation in Finland looks completely different in comparison to other European countries, if a broader range of dimensions is taken into consideration:

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[119] U. Teichler, I. Ferencz and B. Wächter (eds.) *Mapping Mobility in European Higher Education, Vol. 1: Overview and Trends.* Bonn: Deutscher Akademischer Austauschdienst (Dok and Mat, No. 69) (http://ec.europa.eu/education/erasmus/doc992_en.htm).

[120] A. Cavalli and U. Teichler (eds.) (2015) Special issue, "Migration and Mobility in Science", *European Review*, 23 (forthcoming).

[121] U. Teichler (2004) "The Changing Debate on Internationalisation of Higher Education", *Higher Education*, 48 (1) 5-26.

- 51% of Finnish academics surveyed stated that they emphasize international content and perspectives in their teaching, as compared to 63% of academics on average across seven European countries;
- 16% of Finnish academics had taught in foreign countries recently as compared to 15%;
- 60% as compared to 64% stated a strong international approach in research;
- 18% as compared to also 18% had recently co-authored publications with scholars located in other countries;
- 51% as compared to 46% had published recently in a foreign countries;
- 13% as compared to 16% had international research funds in recent years; and
- Foreign language use by Finnish scholars in research and teaching was, according to different measures, slightly above the average of the seven European countries.

All this suggests that while internationalisation in Finland may not be as impressive with respect to some quality and success criteria, it is not deplorable. Creativity might be at place as regards improvement in many respects, whereby mobility is unlikely to be the key issue.

Finally, Finland might take the lead in improving the state of knowledge on internationalisation of higher education and research by supporting and reinforcing in-depth analyses in this domain. In fact, a few Finnish experts were highly active in the past. Improved relevance might help identifying new ways of improvement.

Membership of the International Panel

PANEL MEMBER	ORGANISATION
Professor Ellen Hazelkorn, Chairperson	Policy Advisor to the Higher Education Authority, and Director, Higher Education Policy Research Unit (HEPRU), Dublin Institute of Technology, Ireland
Professor Claire Callender	University College London Institute of Education, and Birkbeck, University of London, United Kingdom
Dr Manja Klemenčič	Faculty of Arts and Sciences, Harvard University, United States
Mr Valto Loikkanen	International Entrepreneur and Investor, CEO of Grow VC Group International, Horizon 2020 Independent Expert Advisory Group for European Commission, Finland
Professor Ulrich Teichler	International Centre for Higher Education Research Kassel, University of Kassel, Germany
Dr Jani Ursin	Finnish Institute for Educational Research, University of Jyväskylä, Finland

Programme for the International Panel

Day 1: 16 February 2015

Time	Programme
08:30 – 09:00	Transfer to the Ministry
09:00 – 10:00	Academy of Finland + Strategic Research Council Mr Arto Mustajoki Ms Riikka Heikinhemo
10:00 – 12:00	Ministry of education and Culture Ms Anita Lehikoinen (Permanent Secretary) Ms Riitta Maijala (Secretary General Ministry)
12:00 – 13:00	Private lunch and discussion among panel members
13:00 – 14:30	UNIFI Board (Universities) Mr Jukka Kola (University of Helsinki) Ms Suvi Ronkainen (University of Vaasa) Mr Kalervo Väänänen (University of Turku) Mr Matti Manninen (University of Jyväskylä)
14.30 – 15:30	Tekes Mr Kai Öistämö (Chair of the Board + chair Board Tampere University) Ms Ilona Lundström (Tekes)
15:30 – 15:45	Tea/coffee
15:45 – 16.45	Research Institutes Ms Anne-Christine Ritschkoff (VTT) Mr Elias Einiö (VATT)
16:45 – 19:00	Panel Meeting
19:00	Dinner with Representatives of the Ministry of Education and Culture

Day 2: 17 February 2015

Time	Programme
09:00 – 10:30	Arene Board (University of Applied Sciences) Ms Outi Kallioinen (LAMK) Mr Tapio Huttula (HUMAK+KARV) Ms Anneli Pirttilä (Saimaa) Mr Turo Kilpeläinen (Kajaanin amk)
10:30 – 11.30	Ministry of Employment and the Economy, Innovation Department

	Mr Petri Peltonen (DG) Mr Mikko Huuskonen.
11:30 – 12:30	Research Foundations Mr Kalle Korhonen (Kone Foundation) Ms Liisa Suvikumpu (Delegation for the Finnish Foundations)
12:30 – 13:30	Lunch + discussion among panel members
13:30 – 14:30	Business Organisations Mr Jaani Heinonen (Team Finland, Ministry of Employment and the Economy)
14:30 – 15:30	Regional Authority Representatives and Civil Society Representatives Mr Heikki Helve (Development manager, City of Kuopio) Ms Tiina Rosenberg (chair of the Central Arts Council & the Rector of the Art University)
15:30 – 15:45	Tea/coffee
15:45 – 16.45	Academies/Learned societies Ms Lea Ryynänen-Karjalainen (Federation of Finnish Learned Societies) Mr Olavi Nevanlinna (Council of Finnish Academies)
16.45 – 18:00	Panel Meeting
18:00 – 20.30	Private dinner and further discussion among panel members

Day 3: 18 February 2015

Time	Programme
09:00 – 10:00	Unions Mr Kaarle Hämeri (Professor Union) Mr Seppo Sainio (The Union for University Teachers and Researchers in Finland) Mr Sture Fjäder (AKAVA)
10:00 – 11:00	Students Mr Jarmo Kallunki (SYL) Mr Jari Järvenpää (SYL) Mr Joonas Peltonen (SAMOK) Ms Anni Vesa (SAMOK)
11:00 – 12:00	KARVI Finnish Education Evaluation Centre (FINEEC) Ms Helka Kekäläinen Mr Harri Peltoniemi
12:00 – 13:00	Private lunch and discussion among panel members
13.00 - 13.45	Confederation of Finnish Industries (EK), and Chairperson, Aalto University Board Mr Matti Alahuhta
13:00 – 16:00	Panel Meeting
16.00	Transfer to the airport

Appendix B Benchmark case study: Denmark

AnnaKarin Swenning

Structure and characteristics of the HEI system

B.1 Main characteristics of the HEI system

Danish higher education programmes are organised according to a dual division between research-based and professionally oriented programmes. The purpose of the research-based programmes is to educate students to the highest international standards within and across the research-based disciplines, whereas the purpose of the professionally oriented programmes is to ensure education closely based on practice and at an international level to meet the need for well qualified professionals in the private and public sectors.

The research-based programmes are offered by eight universities and in 2012 there were more than 130,000 registered students at the Danish universities. The universities offer research-based education in a three cycle degree structure – bachelor, master and PhD levels. The universities are state-funded, autonomous institutions governed by boards with external majority. There are also university level institutions of fine and performing arts, design and architecture offering research-based programmes starting from Bachelor's and continuing with Master's and PhD programmes.

The professionally oriented programmes with approximately 83,000 students are mainly offered by seven University Colleges and nine Academies of Professional Higher Education. The Danish University Colleges offer Professional Bachelor's programmes in areas such as teacher training, engineering, business, nursing, health, nutrition and social work. The Academies of Professional Higher Education offer Academy Profession (AP) degree programmes and Professional Bachelor's degree programmes.[122]

Higher education in Denmark is free for students from the EU/EEA and for students participating in an exchange programme. For other students annual tuition range from 6 000 to 16 000 Euros and a number of scholarships and grants are available from the institutions and from public funded schemes.[123] The Danish national targets are that 60 per cent of a youth cohort is to complete a higher education by 2020 and at least 25 per cent is to complete a long-cycle higher education.[124]

B.2 Main actors in the HEI system

B.2.1 Responsible Ministries

The Ministry of Higher Education and Science[125] is responsible for research, innovation and education above high school/upper secondary school. The Ministry promote and coordinate interaction between industry and trade, centres of research and education and strengthen industry and research policies. The Ministry of

[122] http://studyindenmark.dk/study-options/danish-higher-education-institutions

[123] http://studyindenmark.dk/study-options/tuition-fees-and-scholarships

[124] The National Reform Programme, Denmark, The Danish Government April 2014

[125] The ministry is formerly known as the Ministry of Science, Technology and Innovation

Education[126] is responsible for general education policies and for ensuring that educational programmes are consistent with existing policies.

A number of artistic higher education programmes in Denmark are placed under the Ministry of Culture. Thus, the Ministry is responsible for determining the economic frameworks and overall development objectives for the institutions. The programmes are located at the national institutions of education within the areas of fine arts, classical and rhythmic music, film and theatre and dance. Also, a very limited number of professionally oriented programmes are offered at institutions under the auspices of other ministries, e.g. the Ministry of Defence and the Ministry of Justice, as well as by some of the universities.

B.2.2 Universities, colleges and public research institutes

Denmark has eight universities and the present structure of Danish universities was implemented in January 2007. New universities were established on basis of mergers between some universities and government research institutes: 25 universities and research institutions were reduced through merger to eight universities and three research institutions. The universities vary in size but are all regulated by the University Act. The major part of the publicly supported R&D takes place at the universities. Five universities are multi-faculty universities whereas three are specialised universities. The universities in Denmark are:

- University of Copenhagen
- Aarhus University
- University of Southern Denmark
- Roskilde University
- Aalborg University
- Technical University of Denmark
- Copenhagen Business School
- IT University of Copenhagen

Universities Denmark (former Danish Rectors' Conference) is the association of the eight Danish universities. The website is functioning as a portal to the Danish universities. The organisation is a forum for cooperation among the universities and promotes the university sector both nationally and internationally.

During the 2000s a number of University Colleges and Academies of Professional Higher Education offering professionally oriented programmes have been established.

At present there are seven University Colleges which are self-governing organisations based on a vertical management structure with a board that counts 10-15 members. The board has the general and strategic responsibility for the quality and development of educations at the institution. The management of the institution also includes the responsibility for educational activities, efficiency and economy. The university colleges in Denmark are:

- Metropolitan University College
- University College Copenhagen
- University College of Northern Denmark
- University College South Denmark

[126] The ministry is formerly known as the Ministry of Children and Education.

- University College Lillebaelt
- University College Zealand
- VIA University College

Furthermore, there are nine Academies of Professional Higher Education. The organisation of academies of professional higher education is based on a vertical management structure with a board. The board has the general and strategic responsibility for the quality and development of programmes at the institution. The management of the institution also includes the responsibility for educational activities, efficiency and economy. The members of the boards represent the institutions that comprise the particular academy of professional higher education, i.e. vocational colleges. The academies of professional higher education in Denmark are:

- The Copenhagen School of Design and Technology
- Zealand Institute of Business and Technology
- Danish Academy of Business and Technology
- IBA International Business Academy
- Lillebaelt – Academy of professional higher education
- Copenhagen Business Academy
- EA Business Academy SouthWest
- Business Academy of higher education MidWest
- Business Academy Aarhus

As mentioned earlier there are also several university level institutions of fine and performing arts, design and architecture, as for example the Royal Danish Academy of Fine Arts, School of Design and the Royal Danish Academy of Fine Arts, School of Architecture.

B.2.3 Intermediary organisations

The Ministry of Higher Education and Science includes two agencies responsible for different questions regarding higher education, research and innovation: the *Danish Agency for Science, Technology and Innovation* and the *Danish Agency for Higher Education*.

The Danish Agency for Science, Technology and Innovation performs tasks related to research and innovation policy and provides secretariat services to and supervises the scientific research councils. The aim is to create continuously better conditions and settings for research and innovation to benefit society.[127]

The Danish Agency for Higher Education[128] handles tasks within the overall sector of higher education including the Danish students' Grants and Loan Scheme. The work of the Agency includes policy development, policy implementation, management of institutions, economics, law, grants, administration, etc. The aim is for example to ensure better quality and coherence in the higher education programmes and create

[127] http://ufm.dk/minister-og-ministerium/organisation/styrelsen-for-forskning-og-innovation/om-styrelsen/om-styrelsen

[128] The Danish Agency for Higher Education was established 1 October 2013 and replaces the Agency for Higher Education and Educational Support and the Agency for Universities and Internationalisation.

optimal conditions for the higher education institutions' handling of their respective tasks regarding education and development.[129]

Apart from the Agencies, there are also different councils and committees, as for example an external expert committee on quality in higher education which has been set up in order to strengthen higher education.[130] Another example is the Danish Council for Research and Innovation Policy which was established in 2014. The objective of the council is to further the development of Danish research, technology and innovation to the benefit of society.

B.2.4 Main bodies for quality assessment / quality management and accreditation

The Danish Accreditation Institution was established in 2007 under the Ministry of Higher Education and Science as an independent institution. The Accreditation Institution comprises the Accreditation Council (the decision-making authority) and ACE Denmark (the accreditation operator). The aim is to create a system to ensure and document the quality and relevance of higher education institutions in Denmark.[131]

The Danish Agency for Higher Education also has a supervisory role and produces different kinds of monitoring reports and reviews.[132]

The Danish Evaluation Institute (EVA) is an independent state institution established under the Ministry of Education in 1999. The institute succeeded the Evaluation Centre which existed from 1992–1999. The institute evaluate at all levels – from day care centres and schools through upper secondary schools and vocational colleges to universities and adult education. Research and evaluations are carried out on their own initiative as well as on request from ministries, local authorities and educational institutions among others.[133]

B.3 Acts and regulations

Institutions of higher education in Denmark have a long tradition of academic freedom and autonomy. The ministries are responsible for the overall regulations for all institutions and these include regulations concerning the admission of students, the structure of studies, programmes offered, awarding of degrees and appointment of teachers and academic staff.[134]

The universities are regulated by the *University Act* which has been revised during the 2000s. With the new University Act of 2003 a major change of university governance was carried out. Responsibilities were centralised to university boards (with predominantly external members) and the vice-chancellors were appointed by the boards. Internally, the authority of the vice-chancellor, dean and department heads was restructured, and at present the deans, in particular, have a much stronger role in recruitment issues, organisational decisions and in the allocation of internal resources. The University Act was lastly revised in 2011 and the aim of the reform was to give the universities more autonomy in setting their individual organisational and management structure so as to increase the involvement of staff and students and to

[129] http://ufm.dk/minister-og-ministerium/organisation/styrelsen-for-videregaende-uddannelser/om-styrelsen

[130] http://ufm.dk/en/education-and-institutions/councils-and-commissions/the-expert-committee-on-quality-in-higher-education-in-denmark

[131] http://en.akkr.dk/about-us/about-the-danish-accreditation-institution/

[132] http://ufm.dk/en/the-minister-and-the-ministry/organisation/danish-agency-for-higher-education

[133] http://english.eva.dk/about-eva

[134] http://ufm.dk/en/education-and-institutions/the-danish-education-system/general-organisation-and-administration

strengthen openness, for instance by including external members in nomination and appointment boards. [135]

Furthermore, a new model for the *development contracts* were introduced in 2011. The contracts are three-year agreements between each university and the Ministry of Higher Education and Science. The aim is to focus on the individual university's goals and results. The regulation rests on a foundation of autonomy, with each university setting its own goals and level of ambition in a binding performance contract.[136]

The universities have also agreed on a code of conduct for offering university programmes to international students. The code of conduct is a supplement to existing Danish legislation.[137]

The legal basis of academies of professional higher education is regulated by the *Act on Academies of professional higher education*.[138] The legal basis of the University Colleges is regulated by the *Act on University colleges of higher education*.[139] Like Danish universities, each university college and academy of professional higher education enters a development contract with the Ministry of Higher Education and Science.

B.4 Funding of HEI

In 2012, Denmark invested DKK 56.4 billion in public and private R&D, representing 3.09 per cent of GDP. Compared to the other OECD countries, Denmark is one of the countries with the highest R&D investments as a percentage of GDP (in 2012 Denmark was positioned as number six which was a step up from 2011). The public sector performed R&D equivalent to DKK 19.4 billion in 2012, corresponding to 1.06 per cent of GDP. Denmark thus continues to meet the Barcelona Objective of using 1 per cent of GDP on public R&D investments. In a comparison of OECD countries' public R&D investments in relation to GDP, Denmark comes in fourth in 2012, surpassed only by Iceland, Finland and Sweden.[140]

Funding of HEI, i.e. teaching and research is separated in Denmark. Accordingly, HEIs receive separate budgets for teaching and research. For the funding of education the taximeter principle is used, which links funding directly to the number of students who pass their exams. The taximeter rate varies according to subject field and level of education. An important feature is that HE institutions do not receive compensation for students who fail or do not take exams. In 2009, a new completion bonus was introduced conditional upon study duration. Universities are for instance only paid the completion bonus upon the student completing his/her study programme within a specified period. From 2009, the universities receive bonus when students complete a Bachelor programme within the prescribed study period plus one year and bonus when students complete a Master's programme within the prescribed study period.[141]

In 2010 the Danish government implemented a new model for distribution of basic research funding. While most of the research funding is distributed in an incremental

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[135] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin.

[136] http://ufm.dk/uddannelse-og-institutioner/videregaende-uddannelse/universiteter/styring-og-ansvar/udviklingskontrakter

[137] http://dkuni.dk/English/Our-Work/Code-of-Conduct

[138] http://ufm.dk/en/education-and-institutions/higher-education/business-academies/about-the-business-academies

[139] http://ufm.dk/en/education-and-institutions/higher-education/university-colleges/about-the-university-colleges

[140] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[141] Quality-related funding, performance agreements and profiling in higher education (2011).

way, each year 2 % of the funding is allocated to a restructuring fund which is redistributed to the universities according to a so-called 45-20-25-10-model. According to the model 45 % of the funding is distributed according to the universities' education funding, 20 % is distributed in accordance with the universities' external research funding, i.e. research funding which the universities' have obtained in the research councils, from the EU, etc., 25 % of is distributed in accordance with the universities' research publishing (bibliometrics) and 10 % is distributed in accordance with the number of students having completed their PhD thesis.[142] This change in the research funding system is intended to link funding to outcome, as the bibliometric indicator identifies and measures scientific publishing across research institutions, including universities. The goal of the indicator is to strengthen Danish research.[143]

Apart from the basic funding there are also funding on a competitive basis. The most important competitive funding instruments are managed by the two research councils, the Danish Councils for Independent Research and the Danish Council for Strategic Research. The funding via the research council system increased from 2008 – €292 million – to €350 million in 2010, but decreased in 2012 to €272 million.[144]

The Danish Councils for Independent Research are responsible for funding of researcher-driven research. It is an umbrella organisation covering five "sub-"research councils: the Research Council for Culture and Communication, the Research Council for Nature and the Universe, the Research Council for Society and Trade, the Research Council for Health and Illness, and the Research Council for Technology and Production. These councils fund research based in a responsive mode (without predefined focus, thematic areas or policy-related goals).

The Danish Council for Strategic Research was established in 2004 as an innovation within the Danish funding system for research. The Council consists of a Board and a number of programme commissions. The Council seeks to ensure that strategic research in Denmark is organised to meet the challenges facing Danish society. The aim is to ensure Denmark's position as a global frontrunner regarding welfare, wealth and science in the short and long term.

The Danish National Research Foundation (DNRF) is an independent organisation established by the Danish Parliament in 1991 with the objective to promote and stimulate basic research at the highest international level at the frontiers of all scientific fields. The Center of Excellence (CoE) program is the main funding mechanism, but also a number programs and initiatives have been launched specifically targeted at increasing the level of internationalisation of Danish research communities. Since 1991, the foundation has committed itself to supporting Danish research with more than 6 billion DKK.[145]

With external funding at 20 per cent, Denmark is located above the OECD average. The majority of the externally funded research at Danish universities is funded by national private non-profit organisations. Only a small proportion of research at Danish universities is funded by business. This should be viewed in light of the fact that private non-profit organisations are often established by private companies. Furthermore, Denmark only has publicly funded universities, which do not have the same need for external funding as private universities.[146]

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142 http://ufm.dk/en/education-and-institutions/higher-education/danish-universities/the-universities-in-denmark/economics-of-university-sector/funding-for-research

143 http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/dk/country?section=ResearchPerformers&subsection=HigherEducationInstitutions

144 http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/dk/country?section=ResearchFunders&subsection=GovernmentAndRegionalAuthorities

145 http://dg.dk/en/about-us/

146 The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

As a result from the Danish Globalisation Strategy which the Danish Government presented in 2005, the Parliament has substantially increased the public funding of research. The Danish Globalisation Strategy focuses on the means to obtain the government's goal of strong competitiveness and relational power in Denmark and that is to create world class educations, strong and innovative research, more entrepreneurs and to promote adaptation and renewal in all parts of the Danish society. The aim is, among other things, to increase access to higher education, creating more PhD positions, stimulating a further intensification of the internationalisation of higher education as well as to develop a more effective innovation relationship between universities and the private sector.[147]

B.5 System of accreditation and quality control

Up until July 1 2013, EVA was responsible for the accreditation assessments of higher education institutions. The task is now carried out by the Danish Accreditation Institution. The institution certifies higher education institutions, their programmes and local provision of programmes. Accreditation is mandatory and a condition for receiving public funding. The accreditation system is based on the 2013 Danish Accreditation Act. The Danish Accreditation Institution conducts institutional accreditation, which allows each institution to form a system that develops quality and relevance in all their programmes. The institutional accreditation includes an assessment of the institution's overall quality assurance system. The respective institution's self-evaluation report, site visits at the institution, documentation and key figures are also included in the accreditation process.

Both the Danish Evaluation Institute and the Danish Accreditation Agency play a significant role in the national system of quality assurance. The standard and quality of educational provision in the Danish higher education system are assured by a number of elements, including: common rules and guidelines specifying the aims, contents and duration of programmes and individual subjects; testing and examination system; ministerial approval of provision and inspection; and accreditation of higher education programmes.[148]

To measure how Danish research and innovation are positioned in an international context a set of indicators are used. The annual report Research and Innovation Indicators[149] provide a wide range of indicators that describe different aspects of Danish research quality, such as investments in research and development as a percentage of GDP, share of innovative companies, patent applications as well as scientific publications and citations. The indicators apply to the research community, politicians and the wider community.[150]

B.6 Feedback on the structure and characteristics of the HEI system

During the 2000s the HEI system in Denmark has been through a fundamental reform process as regards governance, and performance based funding. Generally the Danish reforms can be divided into four main initiatives: a management reform, an educational reform, a financial reform and mergers between universities and the sector's research institutes.[151]

Two major reforms have contributed to change the management structure of the Danish universities. Danish universities have had a long tradition of decentralised

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[147] Danish University Evaluation 2009 – Evaluation report (2009).

[148] http://ufm.dk/en/education-and-institutions/the-danish-education-system/quality-assurance

[149] Before 2014, it was called the Research Barometer.

[150] http://ufm.dk/forskning-og-innovation/statistik-og-analyser/forskning-og-innovation-i-internationalt-perspektiv/forskningsbarometer

[151] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin.

decision-making, but in 1993 a university reform changed their internal governance structure. As described earlier, this was supplemented by the revisions of the University Act 2003 and 2011. Responsibilities were centralised to university boards (with predominantly external members) and the vice-chancellors were appointed by the boards. The universities' relationship with the state changed whereby they gained more organisational autonomy, but also entered into detailed contracts with the state regarding performance indicators and impact assessments.[152] In the University Evaluation from 2009 it is concluded that more autonomy of the universities has been achieved and the decision-making capacity of universities has been improved.[153].

The University Act from 2003 also contained new regulations for education. Generally, education obtained a more significant place in the text of the Act and the universities were promised a simplification of the rules. The system of rules for university education was – and still is – very complex and is published in many different regulations and laws.[154]

There have also been some changes of the postgraduate education. Since 2004, the number of PhD students has gradually increased. This is a part of the Danish target that public research should be at least one per cent of the gross domestic product.

During the 2000s University Colleges and Academies of Professional Higher Education were established. The vision was to offer more practice-oriented higher education and to contribute to the objective of the Danish Government that 60 per cent of all young people must complete a program of higher education. A recent evaluation of the Academies of Professional Higher Education shows that the Academies are contributing to the objectives, but also concludes that the institutions still need to work more with quality assurance, the knowledge base etc.[155]

The merger between universities and the sector's research institutes is another major reform that has taken place during the 2000s. The purpose of the mergers was to integrate research into the universities, connecting it better with education and other research, while outsourcing investigative and regulative functions to other agencies. However, at least some years ago this seemed to have caused organisational overload and weak integration of the institutes.[156]

During the last two decades the Danish Parliament has substantially increased the public funding of research. As described in previous chapter, a Globalisation Strategy was adopted in 2006, which has contributed to strengthen public funding of research.

In the beginning of the 1990s, Danish research also received new resources with the establishment of the Danish National Research Foundation (DNRF). The objective was to focus resources on curiosity-driven research that neither the research councils nor the universities themselves were seen as capable of providing.[157] One factor often mentioned as crucial for the success of Danish research is the *Centres of Excellence* that has been created by DNFR. Since the start more than 80 centres have been established. The Foundation has recently been evaluated with very positive results. Some aspects that are highlighted as very important are the focus on talents and the Foundation's willingness to provide long-term financing. One negative aspect is that there are few centres within social sciences and humanities. Analysis of publication

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[152] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin.

[153] Danish University Evaluation 2009 – Evaluation report (2009).

[154] Danish universities – a sector in change, Universities Denmark 2009.

[155] Evaluering af erhvervsakademistrukturen, Rambøll 2013.

[156] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin.

[157] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin.

data from the centres confirms that the Foundation has had a significant effect, but at the same time the analysis shows that the Foundation has strengthened an already positive development rather than being a turning point itself.[158]

Performance of the Danish HEI system

In this chapter we provide key statistics and findings about the system performance covering education, research, third mission as well as cost effectiveness over last years to illustrate the performance of the Danish HEI system.

B.7 Education

B.7.1 Access, graduation and employability

In 2012 there were more than 130,000 registered students at the Danish universities, of whom 43 per cent were women.[159] In July 2013 approximately 63 000 students were offered admission to higher education which is an increase with 44 per cent since 2005.

The prerequisite to access higher education is graduation from upper secondary programmes designed to prepare students for tertiary education. In Denmark the graduation rate from these programmes has shifted in the past years. As outlined in Table 1, 57 per cent of the students graduated in 2010. This number decreased in 2011 (50 per cent) and increased again in 2012 to 62 per cent. The entry rate into tertiary education has increased from 65 per cent in 2010 to 74 per cent in 2012. Tertiary educational attainment amongst the age group 35-44 was over 43 per cent in 2013 which is above the EU 2020 target of at least 40 per cent.

Table 1 Tertiary educational attainment

	Definition	2009	2010	2011	2012	2013	2014	Source
Graduation rate from upper secondary programmes designed to prepare students for tertiary education (ISCED 3A)			57	50	62			OECD EaG 2012-2014
Entry rate into tertiary education (type A)			65	71	74			OECD EaG 2012-2014
Tertiary educational attainment (% of population aged 30-34)	EU 2020 target at least 40%	40.7	41.2	41.2	43.0	43.4		Eurostat

The education level among the Danish population has been improved over the years. Since 1993 the number of employees with a bachelor degree has increased by 275 per cent and the number of employees with a master degree has increased by 95 per

[158] Aagaard & Schneider (2014a). Danmark som rollemodel? Forskningspolitik 01/2014.

[159] http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/dk/country?section=ResearchPerformers&subsection=HigherEducationInstitutions

cent.[160] The number of adults between 25 and 34 years who have attained tertiary education was 40 per cent in 2012 compared to 38 per cent in 2010. As described in chapter 1 the government's goal is that that 60 per cent of a youth cohort is to complete a higher education by 2020 and at least 25 per cent is to complete a long-cycle higher education.

The employment rate of people with higher education has remained over 80 per cent over the last 5 years, while the employment rate of people with upper secondary and post-secondary non-tertiary has been around 77 per cent and people with less than primary, primary and lower secondary has remained around 53 per cent. Moreover, the median income is influenced by the education level, even though it has fluctuated in all groups over the last years.[161]

B.7.2 Internationalisation and mobility of students

The continued development of cooperation in European higher education has been a governmental priority, not only to facilitate mobility, but to enhance quality and strengthen the Danish higher education system's attractiveness and competitiveness. The Danish higher education system has become more comparable and transparent for national and international students and other stakeholders. This has in part been realised through the introduction of the three cycle degree structure – bachelor, master and PhD – and the full implementation of the ECTS credit system, flexible learning paths, student-centred learning and Diploma Supplement free of charge for all students in higher education.[162]

The internationalisation of education and training is high on the political agenda in Denmark. The goal is to enforce incoming and out-going mobility and strengthen the participation of Danish universities in international cooperation within education and research. In 2013, the Government launched the first part of an action plan to, among other things, increase the number of Danish students going abroad.[163] As outlined in Table 2, almost 1 per cent of the student population in Denmark went abroad between 2009 and 2012. However, the number of foreign students as percentage of student population in Denmark was around 10 per cent during the same period.

Table 2 Mobility of students

	Definition	2009	2010	2011	2012	2013	2014	Source
Foreign students as percentage of student population in the host country	Tertiary (ISCED 5–6)	9.62	10.88	11.47	11.74			Eurostat
Students going abroad (Outward mobile students as percentage of student population in country of origin)	Tertiary (ISCED 5–6)	0.96	0.96	0.94	0.87			Eurostat

B.8 Research

The Research and Innovation Indicators report for 2014 shows that Denmark is one of the top OECD countries in terms of investments in research and development in 2012.

[160] http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/dk/country?section=ResearchPerformers&subsection=HigherEducationInstitutions

[161] Eurostat 2009-2014.

[162] Danish Science, Innovation and Higher Education – a Global Perspective (2013).

[163] http://ufm.dk/uddannelse-og-institutioner/politiske-indsatsomrader/politiske-indsatser-pa-uddannelsesomradet

As described in chapter 1, public investment in R&D accounted for 1.6 per cent of GDP, ranking Denmark fourth out of all OECD countries for public R&D investment. Private R&D investment accounted for 2.03 per cent of Danish GDP. Medical and health sciences is by far the most prioritised area in Denmark, with more than 1/3 of all public investments going to this scientific field. Furthermore, Denmark is the country with the largest share of R&D investments in the medical and health sciences.[164]

In 2012, more than 39,000 persons were engaged in research and development in the public sector in Denmark, corresponding to almost 22,000 full-time equivalents (FTE). When adjusted for population, Denmark is ranked fourth in an international comparison regarding number of persons involved in research and development. Finland takes the second place and Norway the third. In the same way Denmark awards the seventh highest number of PhDs in the OECD, right after Finland on sixth place.[165]

B.8.1 Research output

The Research and Innovation Indicators report for 2014 shows that Danish research continues to perform really well in recognised indicators for research quality. Danish researchers are among the most productive in the OECD regarding scientific publications. In the period 2008–2012 more than 62,000 articles from Danish researchers were registered in Thomson Reuter's database. Denmark is ranked third after Switzerland and Iceland in terms of the number of publications in relation to the size of the population. When comparing the number of citations per publication during 2008–2012, Denmark ranks third (only surpassed by Switzerland and Iceland). When comparing the share of publications among the top 10 most cited publications in 2011, Denmark ranks fourth.[166]

Another indicator of research activities is co-authorships of scientific publications. Many publications are nationally or internationally co-authored. Three quarters of Danish publications are written in collaboration with one or more national institution, resulting in co-authorships. This is only slightly higher than the OECD average of 71 per cent. By contrast, Denmark is well above the OECD average when looking at the proportion of publications that have been co-authored with authors from one or more other country. With 60 per cent of the publications co-authored with at least one researcher from another country, Denmark is one of the countries with most international collaboration.[167]

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[164] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[165] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[166] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[167] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

Table 3 University rankings

University rankings	2009	2010	2011	2012	2013	2014	Source
No. of universities top 100 Shanghai	2	2	2	2	2	2[168]	Shanghai Ranking
No. of universities top 100 QS	2	na	2	2	2	2[169]	QS Ranking
No. of universities top 100 Times Higher	na	0	0	0	0	0	Times Higher Education Ranking

As seen in Table 3, two of the eight universities in Denmark belong to the top 100 in different university rankings, except in the Times Higher Education Ranking, where none of the Danish universities qualify. In the QS World University Rankings 2014 the University of Copenhagen is ranked in 45th place while Aarhus University is placed in 96th place. And in the Shanghai Ranking, the University of Copenhagen is ranked in 39th place while the Technical University of Denmark is placed in 74th place. As such, the University of Copenhagen is ranked as the best university in Scandinavia by the Shanghai Ranking.[170]

B.8.2 Funding from EU and ERC

In March 2014, Denmark had received a total of EUR 971 million from FP7, corresponding to 2.35 per cent of all EU funds in FP7.[171] Denmark is ranked as the third best country for receiving the most EU funding per capita from the FP7 programme. However, when measured compared to GDP, Denmark is seventh on the list.[172]

Table 4 Participation in FP7 (2007-2014)

	2014
Total number of participants	2727
Total EU financial contribution (€ million)	1044.01
Number of Marie Skłodowska-Curie Actions Fellows	166
Number of applicants	11054
Success rate	24.2%
Rank in number of participants signed contracts (EU-28)	11
Rank in budget share (EU-28)	10

Source: http://ec.europa.eu/research/fp7/index_en.cfm?pg=country-profiles

[168] University of Copenhagen (39), Technical University of Denmark (74).

[169] University of Copenhagen (45), Aarhus University (96).

[170] http://www.shanghairanking.com/World-University-Rankings-2013/Denmark.html

[171] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[172] http://ufm.dk/en/newsroom/press-releases/2013/denmark-benefits-from-more-eu-research-funding-than-ever-before

Of the 35 countries receiving FP7 funds during 2007–2013, Denmark has the second highest rate of success measured in number of applications (26.1 per cent) in the Cooperation programme (overall success rate 24.2%). However, there are large variations in Denmark's success rates when they are broken down by the 11 thematic subject areas in the Cooperation programme.

Table 5 ERC grants per year of calls (number of grantees)

Definition	2009	2010	2011	2012	2013
Starting Grant	7	6	10	13	1
Consolidator Grants					6
Advanced Grant	3	4	9	10	4
Proof of Concept			0	1	2
Synergy Grants				0	0

Source: ERC

Comparing the quantity of ERC grants in 29 countries, Denmark is ranked as third (when corrected for population size), performing best in physical science and engineering and health sciences. [173]

B.9 Third mission

The focus on interaction between the university and the surrounding community has increased significantly in recent decades. During the 2000s several actions have been taken by the Danish government to ensure that more of Denmark's knowledge and business positions of strength are translated to new jobs and growth.

During 2012 a new innovation strategy was developed: *Denmark – a nation of solutions. Enhanced cooperation and improved frameworks for innovation in enterprises*. The strategy is the outcome of a strategy process that started in March 2012 and was completed by the end of 2012. It is based on collaborative efforts between the involved ministries, i.e. the Ministry of Science, Innovation and Higher Education, the Ministry of Business and Growth and other relevant sectorial ministries, as well as stakeholders from the Danish innovation system. The strategy contains 27 policy initiatives regarding research, innovation and education. It focuses on three areas:

- Innovation for the grand societal challenges shall be stimulated by re-focused public demand and procurement policies
- The knowledge and technology transfer between public research and companies shall be improved
- The education system shall set a stronger focus on innovation in order to enhance the innovation capacity

In order to measure the effectiveness of the innovation strategy, the Danish government has translated the vision of the innovation strategy into the following STI policy goals:

- The share of companies introducing innovation should be increased, such that Denmark by 2020 is among the five OECD countries with the highest share of innovative enterprises.

[173] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

- Private investments into R&D should be increased, such that Denmark by 2020 is among the five OECD countries with the highest private investments into R&D as a share of GDP.
- The share of highly educated employees in the private sector should be increased, such that Denmark by 2020 is among the five OECD countries with the highest shares of highly educated employees in the private sector.

Furthermore, an INNO+ catalogue was presented in September 2013 which defines 21 concrete areas for research and innovation that are geared towards finding solutions to the grand societal challenges. The catalogue complements the previously introduced RESEARCH2020 initiative since it focuses on the innovation policy that results from the prioritisation outlined in RESEARCH2020.

A new element of the Research and Innovation Indicators report for 2014 is the inclusion of indicators for innovation. For example, the report highlights how a little over half of Danish companies are innovative. Denmark is currently ranked eleventh among OECD countries with the most innovative companies. Furthermore, 41 per cent of Danish innovative companies have introduced new products or production processes, while 44 per cent of the companies have innovated their organisation and/or marketing. This is above the OECD average, especially in the case of organisation and/or marketing innovation.[174]

Regarding patent applications in the OECD countries in 2013, Denmark is located well above the middle, and adjusted for population size Denmark ranks sixth. However, this is a step down compared to Research Barometer 2012, as Denmark has been surpassed by Finland.[175]

B.10 Cost effectiveness

The investments in HEI (as percentage of GERD) have increased from 2009 (28 per cent) to 2012 (32 per cent). The same pattern is seen in the public expenditure (as percentage of GERD). In 2009, the number was 26 per cent and in 2012 it increased to 29 per cent.[176]

In 2014, the Danish Agency for Science, Technology and Innovation, in cooperation with the Nordic Council of Ministers, published a report comparing and analysing the return on private business R&D investments in Denmark, Sweden, Norway and Finland The report shows that there is a positive return on additional investments in R&D for all four countries. Danish companies have the highest marginal rate of return on R&D investments of the countries compared. However, there are large variations in the rates of return across sectors, and in Denmark, the marginal rate of return is highest in the sector covering other services (which for example include wholesale and retail trade, transportation, storage, food service activities and financial and insurance activities). Across countries and sectors there is not a single country that stands out with the highest rate of return across all sectors.[177]

B.11 Conclusions

As described above, the Danish HEI system is well-performing. The educational level among the population is continuously increasing and the Danish government has ambitious goals for the future. The attainment in tertiary education is in line with the

[174] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[175] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

[176] Eurostat 2009-2012.

[177] The Research and Innovation Indicators 2014. Research and Innovation: Analysis and Evaluation 5/2014, Danish Agency for Science, Technology and Innovation.

EU 2020 target of at least 40 per cent. The number of students who were offered admission to higher education has increased with 44 per cent from 2005 to 2013. Denmark is one of the top OECD countries in terms of investments in research and development and Danish researchers are among the most productive in the OECD regarding scientific publications. Denmark is also one of the OECD countries with most international collaboration measured as scientific co-publications. Two of the eight universities in Denmark are on the top 100 in different university rankings. Several actions have also been taken by the Danish government to strengthen the knowledge and technology transfer between public research and the surrounding society.

In 2012 a peer-review of the Danish research and innovation system was conducted for the European Research Area Committee (ERAC). The experts concluded that Denmark is an excellent example of a well-performing R&I system. Its notable strengths lie in a strong education base with excellent higher education and research systems, a strong international standing in terms of comparative international performance in most RDI indicators, a strong public and private sector commitment to continue to maintain the necessary levels of investment into education, research and innovation and a unique Danish approach and culture for innovation and innovation policy. However, a number of concerns also exist which may call for further attention, e.g.: a large and heavy Danish public sector, which tends to dominate the R&I system, and a need to increase the visibility, both in performance and policy attention, of sectors of the Danish economy outside multinational companies in the pharmaceutical, biotechnology and energy sectors.[178]

HEI policies and trends

B.12 National policies

As described earlier the universities in Denmark have been through a fundamental reform process as regards governance, and performance based funding during the last decades. In the beginning of the 1990s, a ministry for research was established and national strategies for research and the universities were drawn up. New funding streams were established, the postgraduate education system was reformed and the research councils were modernised. The period has also seen a strong growth in total research funding and the introduction of an academically oriented performance based floor funding model.[179]

During the 2000s education, research and innovation has become key elements in the development of a knowledge-based, global economy. Education of a highly qualified workforce and the production of new knowledge are central for Danish competitiveness in the future. As mentioned earlier a Globalisation Strategy was presented by the Danish Government in 2005, which among other things has led to increased public funding of research from 2006 and onwards.

Some of the most important university-oriented policy goals introduced in the framework of the Globalisation Strategy were to raise the public investments in research from 0.75 per cent to 1 per cent of the Danish GDP, link the basic public funding of universities more directly to the quality of their activities, integrate the

[178] Peer review of the Danish Research and Innovation System: Strengthening innovation performance (2012).

[179] Aagaard & Schneider (2013). Relationships between policy, funding and academic performance — Examination of a Danish success story. In: Hinze & Lottmann (eds.). Proceedings of 18th International Conference on Science and Technology Indicators, pp. 19-28.

government research institutions (GRIs) into the universities, double the number of PhD students and increase the higher education participation rate from 45 to 50 per cent. As has been described above, several of those goals have already been fulfilled. The Barcelona target, that 3 per cent of GNP should be devoted to research has also been met. There is a discussion if the public investments in research should increase to 1.5 per cent of the Danish GDP in the future.

To fulfil the educational goals the Danish Government has made strong financial efforts to increase the number of students who complete higher education. There is also a focus on how to improve the quality, relevance and consistency of higher education and the Danish government has therefore established an Expert Committee on Quality in Higher Education. As part of its work, the committee is carrying out a review of the quality, relevance and cohesion of the Danish higher education system.[180]

The committee published its first set of recommendations for the Danish Government in April 2014 and its second set in November 2014. A final report which encompasses previous reports is to be published in 2015. One of the recommendations from April 2014 was that a new higher education degree structure should be established. For example, the duration of academic Bachelor programmes should be changed from 3 to 4-years with an integrated option to focus on either the subject area's vocational application or on research-oriented theoretical and methodological aspects. Another recommendation was that a central regulation of student admission within selected programmes or educational streams with a substantial risk of overproduction should be conducted every three years and with a validity period of three years. The committee also recommends fewer and larger education programmes.[181]

B.13 Institutional policies

Danish universities have had a long tradition of decentralised decision-making, but as described earlier several reforms have changed their internal governance structure during the 1990s and 2000s. Responsibilities has been centralised to university boards and the vice-chancellors were appointed by the boards. The universities have gained more organisational autonomy, but also entered into detailed contracts with the state regarding performance indicators and impact assessments.[182] Each university formulates 3-5 individual targets in their performance contracts. The targets are based on the universities own strategies and profiles for education and research.[183]

As mentioned earlier the University Evaluation from 2009 concluded that more autonomy of the universities has been achieved and the decision-making capacity of universities has been improved. The reforms have been welcomed by many, contributing to a more straightforward placing of responsibility with the managers and a more direct and shorter process of decision-making. At the same time some universities experienced an element of dissatisfaction with the abolition of collegial/staff democracy.[184]

The mergers between universities and between universities and government research institutions have been carried out in order to strengthen the university and research sector, especially in an international setting. The question of university profiles did not

[180] http://ufm.dk/en/education-and-institutions/councils-and-commissions/the-expert-committee-on-quality-in-higher-education-in-denmark

[181] http://ufm.dk/en/education-and-institutions/councils-and-commissions/the-expert-committee-on-quality-in-higher-education-in-denmark

[182] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin, (Royal Academy of Sciences, Sweden).

[183] http://ufm.dk/uddannelse-og-institutioner/videregaende-uddannelse/universiteter/styring-og-ansvar/udviklingskontrakter

[184] Danish universities – a sector in change, Universities Denmark 2009.

exist as a key issue for the mergers at the time of the merger process, and in order to be more competitive, the University Evaluation from 2009 recommended a debate on university system diversity, aimed at determining what kind of diversity basis the system should have.[185] The merger processes have in certain ways acted as change drivers, although it was concluded in the University Evaluation from 2009 that the effects of the mergers have not yet been fully materialised. Today, 2015, it is not unlikely that some effects of the mergers do appear.

Conclusions

Although there is still a need for further development of higher education to secure Danish competitiveness in the future, the Danish HEI system is all in all well-performing. Danish research is regarded to be very successful and the impact has steadily increased during the 1990s and 2000s up to the high level it has today. Although the latest data show some signs of stagnation since the end of 2000s, the performance is still at a very high level.[186]

At present there is a discussion in Denmark (and its neighbouring countries) about key factors explaining the success of Danish research. Different factors are mentioned as crucial in various studies as for example the increased allocation of resources, new channels of financing, increased competition in the distribution of resources, large investments in programmes and centres, the merger of universities and research institutions, and more autonomy for universities which have improved their decision-making ability.

However, Danish researchers have recently stressed that the explanation lies in a random combination of more or less isolated research policy reforms and actions, rather than in a carefully planned and executed political strategy. This means that it is difficult to generate recommendations for how research policy should be designed in the future.[187] This conclusion is also drawn in the report *Fostering breakthrough research: a comparative study*, although the report stresses that the increased funding of Danish research during the 1990s and 2000s is a major key factor behind the success of Danish research.[188]

One of the central questions in Danish research policy today is how the recent major reforms will affect academic performance in the coming years. The effects of these changes are not yet visible in the performance indicators as most of the changes have taken place after 2006.[189] At the same time there is also a discussion about how much room there is for further policy changes due to the high and stable level of performance of the research system in Denmark.[190] At present the Danish Council for Research and Innovation Policy is analysing the effects of different key factors for the development in Denmark through, among other methods, bibliometric analysis.

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[185] Danish University Evaluation 2009 – Evaluation report (2009).

[186] Dansk forskning anno 2030 – er vi stadig i verdensklasse? DEA 2014.

[187] Dansk forskning anno 2030 – er vi stadig i verdensklasse? DEA 2014.

[188] Benner & Öquist (2012). Fostering breakthrough research: a comparative study. Akademirapport. Kungl. Vetenskapsakademin, (Royal Academy of Sciences, Sweden).

[189] Aagaard & Schneider (2013). Relationships between policy, funding and academic performance — Examination of a Danish success story. In: Hinze & Lottmann (eds.). Proceedings of 18th International Conference on Science and Technology Indicators, pp. 19-28.

[190] Dansk forskning anno 2030 – er vi stadig i verdensklasse? DEA 2014.

Appendix C Benchmark case study: Ireland

Kristel Kosk, Jelena Angelis

Structure and characteristics of the HEI system

C.1 Main characteristics of the HEI system

Ireland has a binary higher education system. Among the publicly funded institutions, there are seven universities and several college-type institutions:[191] 14 Institutes of Technology, seven Colleges of Education and a number of other third level institutions providing specialist higher education (i.e. in art and design, medicine, business studies, rural development, theology, music and law).[192] Moreover, there is also a relatively small number of well-established private colleges in Ireland. However, their contribution to the whole higher education system in the country is rather small.

The Irish university system offers degree programmes at Bachelor, Masters and Doctorate level in the humanities, sciences (including technological and social) and medicine. Institutions in the technological sector provide programmes of education and training in areas such as Business, Science, Engineering, Linguistics and Music to certificate, diploma and degree levels. Colleges of Education offer two courses – a three-year Bachelor of Education Degree and an eighteen-month Post Graduate Diploma. In the third cycle of education there are also further education schools, that offer vocational, technical and craft education, but as they are not part of the higher education system, they will not be further considered in this case study.

Higher education is mostly free of charge for the students. Thus, most undergraduate students (from the EU/EEA/Switzerland) attending publicly funded third-level courses do not have to pay tuition fees in Ireland. This is regulated under the terms of the Free Fees Initiative,[193] according to which the Department of Education and Skills pays the fees to the HE institution instead. However, students need to cover separate annual charge for the costs of student services and examinations (maximum rate of the student contribution for the academic year 2014–2015 is €2,750).

C.2 Main actors in the HEI system

The Irish HE system consists of several key players:

- Department of Education and Skills
- Higher Education Institutions (universities, institutes of technology, colleges of education, private colleges)
- the Higher Education Authority (HEA)
- the Central Applications Office (CAO) and the Postgraduate Application Centre (PAC)
- Quality and Qualifications Ireland (QQI)

[191] In this case study all higher education institutions, that are not universities, will be called Colleges for reasons of simplicity.

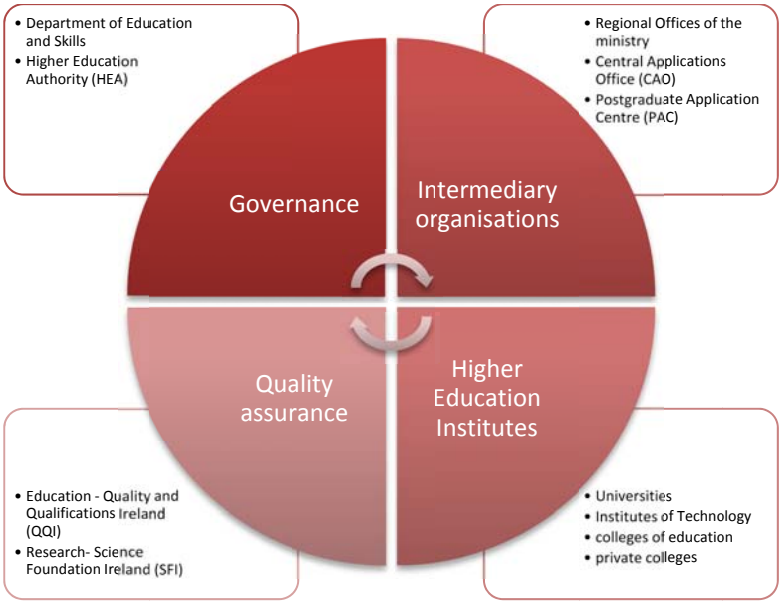
[192] For a list of publically funded HEI in Ireland please visit: http://www.education.ie/en/Learners/Information/Providers-of-Higher-Education/List.html

[193] Further information: http://www.studentfinance.ie/mp9377/course-fees/index.html

- Science Foundation Ireland (SFI)

A schematic representation of key stakeholders in the Irish HE system is presented in the figure below.

Figure 41 Organisational chart of the Irish higher education system



The ministry responsible for educational sector in Ireland is the **Department of Education and Skills**[194] established under the Ministers and Secretaries Act back in 1924. At the head of the Department is the Secretary General, who acts as Chief Executive Officer. He has overall responsibility for implementing and monitoring policy and delivering outputs, and for providing policy advice to the Minister and Government. In managing the Department, the Secretary General is assisted by the Management Advisory Committee representing the most senior officials in the Department. The mission of the Department is "to enable learners to achieve their full potential and contribute to Ireland's economic, social and cultural development". The governing authorities are required to see that strategic development plans in the education sector are in place, and that procedures for evaluating teaching and research are ready. The structure of the Department with emphasis on unit responsible for higher education is presented in the figure below.

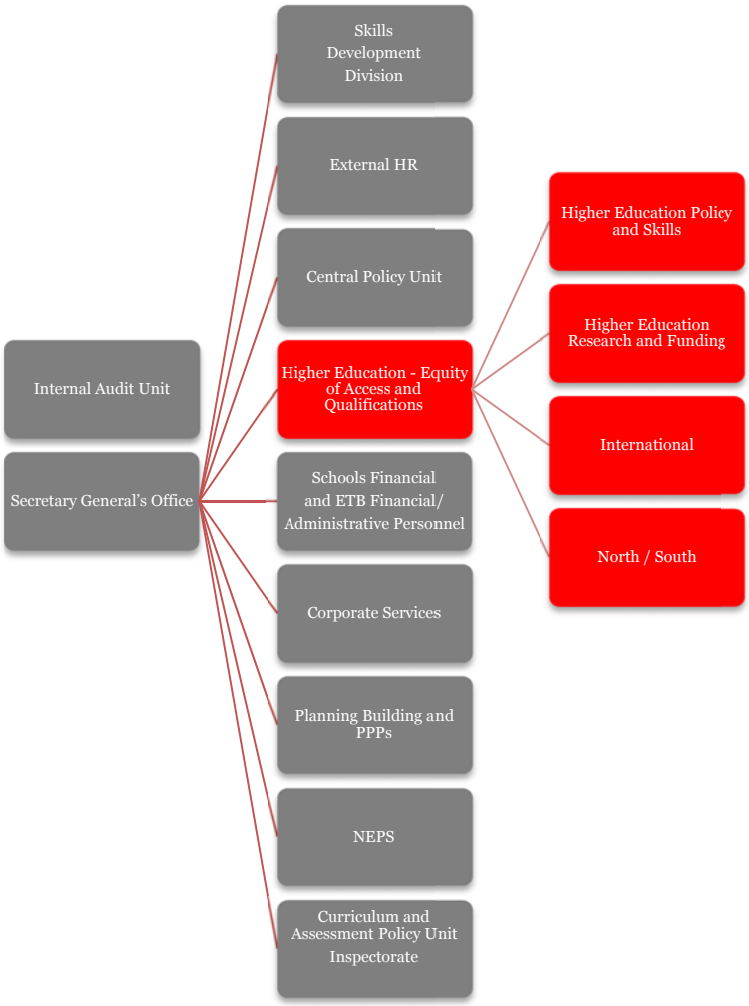
The unit in the ministry which is mainly responsible for higher education is the **Higher Education – Equity of Access and Qualifications Section**. The Section is in charge of the development of national policy on equity of access to higher education for all students and, in particular, for under-represented groups such as disadvantaged students, mature students and students with disabilities. It is also responsible for the provision of Student Grant Scheme,[195] the implementation of EU Directive 2005/36/EC (Mutual Recognition of Professional Qualifications) and the National Framework of Qualifications and associated policies on quality assurance of providers of education and training through Quality and Qualifications Ireland (QQI).

[194] http://www.education.ie/en/

[195] Further information: http://www.studentfinance.ie

The main administration of the Irish education system is centralised in the Department of Education and Skills. The goal of the **Regional Offices** is to make the Department more accessible to the public and to free the Department from excessive preoccupation with details of the operation of the education system. The role of the ten Regional Offices in Ireland is to facilitate a **t**wo-way information flow between the educational users in the regions and the Department. They also promote networking between the different educational partners.

Figure 42. Management and organisation of the Department of Education and Skills. The unit for higher education is presented in red



Source: author's own compilation based on the information from the Department of Education and Skills' web page, http://www.education.ie/en/The-Department/Management-Organisation/

Higher Education in Ireland is carried out by **universities, institutes of technology, colleges of education, and private, independent colleges**. All institutions except for the private, independent colleges are autonomous and self-governing, but substantially state funded (about 90% of their income is from state funds).

The higher education system is split into three main groups of institutions in the following way:

- seven comprehensive universities;

- 14 Institutes of Technology (or IOTs as they are called in Ireland), which historically were set up to specifically cover the country geographically and provide closer links to industry in terms of preparations of skilled labour force;
- a couple of private education providers, which tend to be rather specialised. These institutions do not get any state funding but are being regulated by the Higher Education Authority for quality.

Over the years the boundaries between universities and IOTs started to blur with some IOTs now offering PhD programmes and doing research.

Four out of in total seven universities are constituent universities of the **National University of Ireland (NUI)**, which maintains authority over basic matriculation requirements and reviews the content and teaching of courses.[196] The representative body for 13 of Ireland's Institutes of Technology is **Institutes of Technology Ireland (IOTI)**.[197]

The Higher Education Authority (HEA)[198] is the statutory planning and development body for higher education and research in Ireland. The HEA has wide advisory powers throughout the whole of the third-level education sector. Its role is to oversee the strategic planning as well as evaluation processes in the area of higher education. In addition it is the funding authority for the universities, institutes of technology and other designated higher education institutions. The HEA's mission is "to create a higher education system that maximises opportunities and ensures a high quality experience for students". The HEA is accountable to the Minister for Education and Skills, through her Department, for the achievement of national outcomes for the higher education sector.

The Central Applications Office (CAO)[199] – founded in 1976 – is a central not-for-profit institution responsible for collecting and processing undergraduate entry applications in Irish Higher Education Institutions. The participating universities and colleges retain the function of making decisions on admissions.

The Postgraduate Application Centre (PAC)[200] is a similar organisation to the CAO, with the distinction of being responsible for administration of postgraduate level applications. However, not all the HEIs in Ireland use the help of the PAC for their postgraduate applications. Currently students applying for postgraduate studies at Dublin City University, University College Cork, National University of Ireland (NUI) Galway, Maynooth University, Waterford Institute of Technology, Cork Institute of Technology and 3U can currently do it through the PAC. The Centre also processes applications for the National Qualification Programmes such as the Professional Diploma in Education, and qualifications in Public Health Nursing and Midwifery.

The main body responsible for quality assessment / quality management and accreditation is the **Quality and Qualifications Ireland** (QQI).[201] It is a state agency established by the Quality Assurance and Qualifications (Education and Training) Act 2012[202] with a board appointed by the Minister for Education and Skills. The Agency is responsible for a) qualifications, standards, awards, recognition; b) quality assurance; and c) International Education Mark (IEM). HEA and QQI signed a memorandum of understanding to explain their role and ensure that there is no duplication; that activities are aligned and complimentary to each other.

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[196] http://www.nui.ie/

[197] http://www.ioti.ie

[198] http://www.hea.ie

[199] http://www.cao.ie

[200] http://www.pac.ie

[201] http://www.qqi.ie

[202] http://www.qqi.ie/Publications/Qualifications and Quality Assurance Act 2012.pdf

In the area of **qualifications**, the QQI is responsible for maintaining the ten-level NFQ (National Framework of Qualifications) system including awarding its qualifications and setting its **standards**. The agency also validates education and training programmes and issues extensive **qualification awards**. For example, in higher education they issue awards to mainly learners in private providers. However, the universities and institutes of technology largely issue their own awards. QQI also advises on **recognition** of foreign qualifications in Ireland and on the recognition of Irish qualifications abroad. As a new function of QQI, it will publish a directory of providers and awards in the NFQ. In the area of **quality assurance**, the agency performs external reviews of the effectiveness of quality assurance in further and higher education providers in Ireland. Another new function of QQI is to authorise the use of an International Education Mark (**IEM**) for providers. This will be awarded to providers of education and training (including English language training) who have demonstrated compliance with a statutory code of practice in the provision of education and training to international students. Applications for the IEM will commence in January 2015.

The authority responsible for evaluating quality of research is **Science Foundation Ireland (SFI)**.[203] Science Foundation Ireland (SFI) is the national foundation for investment in scientific and engineering research. SFI invests in academic researchers and research teams who are most likely to generate new knowledge, leading edge technologies and competitive enterprises in the fields of science, technology, engineering and maths (STEM). The Foundation also promotes and supports the study of, education in, and engagement with STEM and promotes an awareness and understanding of the value of STEM to society and, in particular, to the growth of the economy. SFI makes grants based upon the merit review of distinguished scientists.

C.3 Acts and regulations

The Main laws and regulations governing higher education in Ireland are:

- Irish Universities Act 1997
- Institutes of Technology Act 2006
- Qualifications and Quality Assurance (Education and Training) Act 2012

The **Irish Universities Act 1997**[204] is the first comprehensive legislation that affected all seven universities in Ireland. The Act sets out the objects and functions of a university, the structure and role of governing bodies, staffing arrangements, composition and role of academic councils and sections related to property, finance and reporting. Also the relationship between the State and the universities is defined. It confers autonomous statutory responsibilities on universities in relation to the day-to-day management of their affairs, designates modes of accountability and strategic planning procedures for quality assurance, while respecting the academic autonomy of the universities.

Regional Technical Colleges (predecessors to Institutes of Technology) were established in Ireland in the 1960s and they were run as special subcommittees of the Vocational Education Committees in 1970–1992. They started operating on independent basis when the Regional Technical Colleges Acts in 1993 was passed. In the late 1990s, all of the institutions were upgraded to the status of Institute of Technology, which recognised them with institutes of high quality and enabled them to do some research and offer PhD courses. The **Institutes of Technology Act 2006**[205] created a similar relationship between the institutes of technology and the state as the Irish Universities Act 1997 did for the universities. It provided for greater

[203] http://www.sfi.ie

[204] http://www.irishstatutebook.ie/1997/en/act/pub/0024/index.html

[205] http://www.irishstatutebook.ie/2006/en/act/pub/0025/index.html

institutional autonomy, improved governance and a statutory guarantee of academic freedom for the institutes of technology.

Qualifications and Quality Assurance (Education and Training) Act 2012[206] created the QQI (Qualifications and Quality Ireland) via amalgamation of three previously existing agencies to assure quality in the third level of education: FETAC (Further Education and Training Awards Council), HETAC (Higher Education and Training Awards Council) and the NQAI (National Qualifications Authority of Ireland).

Many legislative reforms in the higher education sector, consistent with the Bologna Process, were made during the late 1990s. New need for reforms in Ireland has emerged with the recent economic recession. Many issues such as increased financial pressures, managerial reforms, and mass participation have caught the interest of policy makers. Hence, the current Programme for Government contains a number of commitments in relation to higher education, including:

- a review of the financing of the system
- improvement of learning outcomes
- reform of academic contracts
- increased internationalisation
- greater specialisation by institutions

To implement some of these proposed changes, the legislative programme contains new bills:

- Technological Universities Bill
- Universities (Amendment) Bill

The new **Technological Universities Bill** is about a creation of new universities out of Institutes of Technology. The Dublin Institute of Technology is leading here, as they have historically been much stronger and diverse compared to other IOTs. The Bill explicitly calls for the institutes to have a different set of objectives compared to the traditional universities. The new legislation calls for maintaining the local orientation the institutes had/have but perhaps on a bigger scale (e.g. targeting large multinationals rather than just local companies).

The Universities (Amendment) Bill plans to give the Minister the power to require universities to comply with government guidelines on remuneration, allowances, pensions and staffing numbers in the university sector. It is about reducing the flexibility of employees. The governance structure of the institutions will have to change from a traditional representational model to a more executive (business) model.

Both of these bills are currently at the pre-drafting stage. However, the tricky bit with any legislative changes is that these are rather political. Ireland will have elections in spring 2016. According to the interviewed experts, if these Bills do not pass by September 2015, then it might take longer for them to pass, and they might change or be even abandoned (dependent on the nature of the new government).

C.4 Funding of HEI

The Higher Education Authority Act 1971[207] authorises the Higher Education Authority to allocate the money provided by the Oireachtas[208] (more specifically by the

[206] http://www.irishstatutebook.ie/2012/en/act/pub/0028/index.html

[207] http://www.irishstatutebook.ie/1971/en/act/pub/0022/index.html

[208] Irish National Parliament, see more http://www.oireachtas.ie

Department of Education and Skills) to publicly funded institutions. There are three different types of funding distributed to the HEI:

- Institutional funding, which is the recurrent grant funding
- Capital funding allocated once for physical new infrastructure or for renovating the old one
- Research funding allocated for scientific research activities (salaries, equipment, research specific physical infrastructure etc.)

C.4.1 Institutional funding

Up to 2006, a unit cost allocation model was used by HEA to distribute the core recurrent grant from the state to HEIs. There were considerable delays in generating cost data used as part of that model. In 2006, a new grant allocation model was introduced by the HEA. This new model – the Recurrent Grant Allocation Model – allocates funding based on the type and resource intensity of courses.[209]

The new Recurrent Grant Allocation Model (see schematic representation of the model below) consists of three separate – but related – elements:

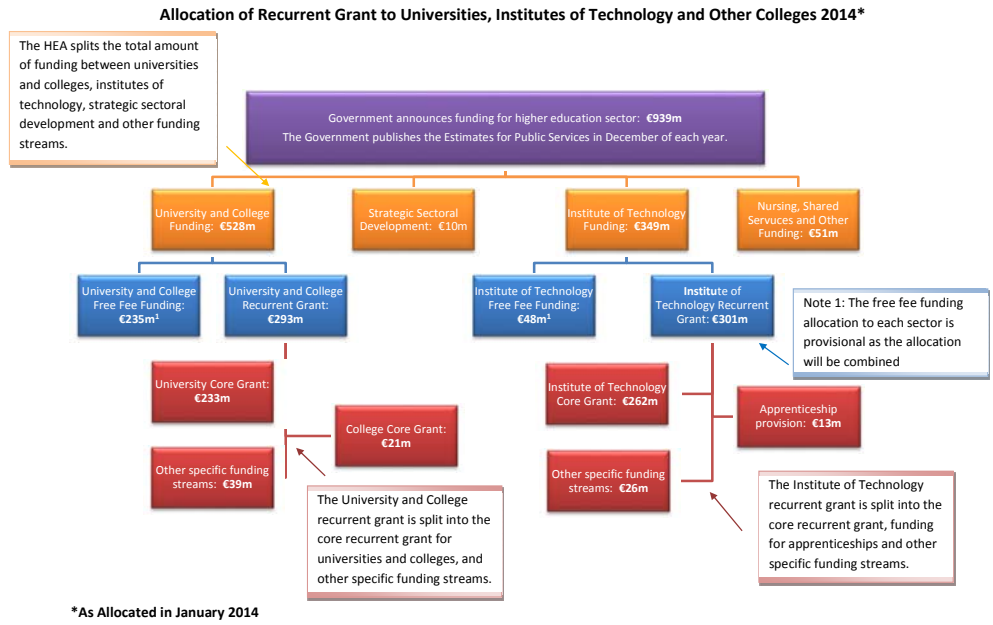
- **An annual recurrent grant** is allocated to each institution using a formulaic approach. The key objectives are clarity, transparency and fairness as to how the institutions are funded. Also, uniformity of core grant allocation for students in the same broad areas, regardless of the institution at which he/she chooses to study and recognition of the extra costs which arise in the case of students from under-represented backgrounds are considered. The annual recurrent grant has two parts: core grant and grant in lieu of undergraduate fees (free fee funding). The annual core grant is allocated as a block grant – the internal allocation of funds as between teaching and research and across faculties and departments etc. is a matter for each institution.

  The formula used for core grant allocation is based on a standard per capita amount in respect of weighted EU student numbers (and non-EU research) in four broad subject price groups. Student numbers in the four groups are weighted to reflect the relative cost of the subject groups. The standard per capita amount depends on the total level of funding received each year. Total available funding divided by total weighted student numbers equals the standard per capita amount.[210] This system draws from the one used in the UK by the Higher Education Funding Council for England (HEFCE). It accounts for the fact that broad groups of subjects have different levels of resource requirements. The Irish State has paid tuition fees on behalf of eligible full-time undergraduate EU students since 1995/96. The free fee funding is based on fee claims submitted by the HEIs.

[209] Comptroller and Auditor General (2010), Special Report 75: Irish Universities Resource Management and Performance.

[210] Further information on the price groups and weightings used in the model can be found at: http://www.hea.ie/sites/default/files/rgam_summary_2014_final.pdf

Figure 43. Overview of the institutional funding allocated to the higher education institutions in 2014



Source: HEA[211]

- **Performance related funding** will be allocated based on benchmarking against best national and international practice, with emphasis on setting targets and monitoring outputs. Currently this part of the model is being planned to start in 2014. It is proposed that up to 10% of the annual core recurrent grant will be linked to performance by HEIs in delivering on national objectives set for the sector.
- **Targeted/Strategic Funding** supports national strategic priorities which may be allocated to institutions on a competitive basis.

While designing the model HEA set the following goals. The model should:

- Support institutional autonomy, while providing meaningful accountability to the various stakeholders
- Promote a strategic approach by institutions to their long-term development, consistent with their existing strengths and capabilities
- Reward institutional responsiveness to national and regional needs
- Increase opportunities for students from all types of backgrounds to benefit from higher education
- Support excellence in teaching, learning and research
- Be transparent and rational
- Provide positive incentives to institutions to diversify and increase their income from non-state sources, consistent with their mission

[211] http://www.hea.ie/sites/default/files/flowchart_of_funding_for_website2014.pdf

- Provide stability in funding from year to year and encourage efficiency in the use of public funding
- Recognise the extra costs which arise in the case of students from disadvantaged backgrounds

The Irish government funded higher education of in total €939m in 2014. The HEA split it between different HEIs; universities and colleges received in total €528m, Institutes of Technology €349m and other types of third cycle education institutions (e.g. nursing schools) received €51m. The rest of the money, €10m, was spent on strategic planning.

Both universities and Institutes of Technology receive two types of institutional funding. One is free fee funding for student fees and the other is the recurrent grant. The recurrent grant for the university and colleges is split into university core grant, college core grant and other specific funding. The recurrent grant for the Institutes of Technology is similarly split into core grant and other specific funding, but they also have an additional stream for funding apprenticeship provision.

C.4.2 Capital Funding

Moreover, there are capital funds available for developing teaching, research and student services, buildings, refurbishment projects, infrastructure development and property acquisition through the Capital Programmes Section of the HEA. The current portfolio of HEA administered physical Infrastructure programmes includes:

- Programme for Research in Third Level Institutions (PRTLI) – Cycle 5
- Third Level General Capital Programme
- Large Items of Research Equipment Database
- Access to Large Items of Research Equipment

C.4.3 Research Funding

The Irish government has made significant investments in programmes designed to enhance the research capabilities, capacity and infrastructure of the HEIs. These investments are made in coherence with national research policies. The programmes financed through HEA have a focus on cross-disciplinary research varying from humanities and social sciences to the bioscience, technology and innovation sector. The aim is to encourage national collaboration while reaching excellent research outputs.

The current portfolio of HEA-administered research programmes are:

- The Programme for Research in Third-Level Institutions (PRTLI) offers third-level institutions an opportunity to build infrastructure, invest in capacity and capability, in line with institutional strategies.
- The Programme of Strategic Cooperation between Irish Aid and Higher Education and Research Institutes 2007–2011 funds innovative research activity across a range of thematic areas within higher education and research institutes in Ireland and in partner countries in support of Irish Aid's mission to reduce poverty.
- FP7 and Horizon 2020: the Higher Education Authority acts as the National Contact Point (NCP) and National Delegate (ND) for Research Infrastructures within the "Capacities" strand of the Seventh Framework Programme (FP7).

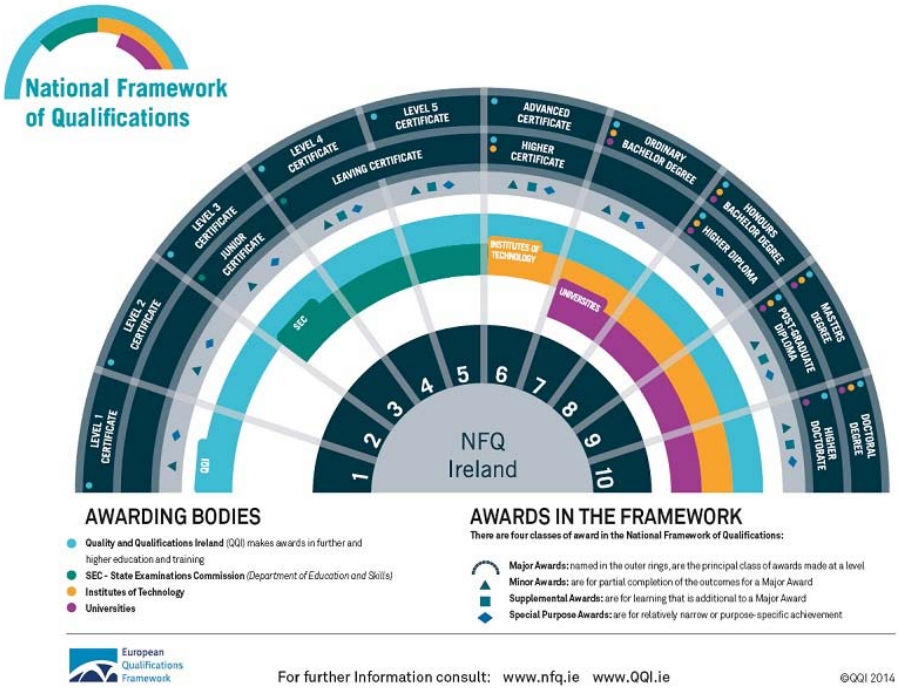
C.5 System of accreditation and quality control

The principal legislation underpinning quality assurance in Irish higher education and training is the Universities Act 1997 and the Qualifications and Quality Assurance (Education and Training) Act 2012. According to the latter the authority responsible for the quality assurance of providers of education and training in the HEI in Ireland is the Quality and Qualifications Ireland (QQI). Its quality assurance functions are

executed and internally quality is assured consistently with Standards and Guidelines for Quality Assurance in the European Higher Education Area. Moreover, the Irish Higher Education Quality Network (IHEQN)[212] provides a forum for discussion of quality assurance/quality improvement issues amongst the principal national stakeholders (practitioners, policy makers and students) involved in the quality assurance of higher education and training in Ireland.

The backbone of the quality control system is the National Framework of Qualifications (NFQ), maintained by QQI, which is a ten-level system (1–10) giving an academic or vocational value to qualifications obtained in Ireland.[213] The system is linked with similar frameworks in Europe to enable mobility between countries as well as to enhance life-long learning. As can be seen from the figure below, the higher education is equivalent to levels 6-10. Different qualification levels indicate how a received award can be used for training, education and employment opportunities. The NFQ's major award-type descriptors are default standards for higher education awards. These levels are described in terms of general (non-subject-specific) indicators of a person's knowledge, skill and competence (i.e. standards for their learning achievements). Also, guidelines may be issued by QQI to assist interpretation of the NFQ and its award-type descriptors. They apply to all bodies, which make awards recognised in the NFQ.

Figure 44. National Framework of Qualifications of Ireland



Source: QQI

[212] http://www.iheqn.ie

[213] Current list of NFQ standards can be found here: http://www.qqi.ie/Pages/Active-NFQ-Standards-for-HE.aspx

The quality control of the higher education sector is done at two levels in Ireland: at institutional and at programme level. Ensuring effective quality assurance procedures of providers involves the following:

- Statutory periodic review of providers by teams of independent reviewers working on behalf of QQI214
- Establishing and promoting frameworks for the enhancement of quality assurance
- Other institutional / system-level reviews

On programme level the validation process normally includes:

- Provider's self-assessment against QQI criteria of the proposed programme
- External assessment against QQI criteria by an expert panel
- Validation decision by QQI based on recommendation of an expert panel
- Report publication following QQI decision on validation
- Follow-up by the provider as appropriate

QQI is currently developing a new policy on monitoring the qualifications and quality assurance landscape of HEIs. Recently the White Paper on Monitoring[215] was published. However, currently the old monitoring system is still used. For the future QQI is looking at changes to decide whether to have one single model or several different models. However, it seems that it will be difficult to establish one unique body as most likely the existing legislation will not allow one model as universities are autonomous.

Some other changes are envisaged. QQI are currently undergoing a consultation process about changes for institutional reviews ('a review of reviews'), which commenced in May 2013. This review is supplemented with a report looking at common themes ('a review of themes') and suggestions on how changes should be implemented.

The reasons why changes in the quality review and assurance system are happening now is to prepare for the next round of institutional reviews which starts in 2016. Institutional reviews take place every seven years; the first was in 2008–2013, the second was in 2009–2012 and the third will be in 2016.

C.6 Feedback on the structure and characteristics of the HEI system

The Irish higher education sector has altered significantly since the 1960s, when expansion of secondary education led to an increased demand for access to higher education. In accordance with the OECD recommendations to further invest in education to enhance economic development, the state began to spend more on the sector as well as started reforming the system.

The reform of Regional Technological Colleges to Institutes of Technologies in 1966 was conducted, which brought major expansion in the sector, making the higher education more accessible to the masses.

The reform in governance was followed by the establishment of Higher Education Authority (HEA) in 1972, which is still functioning under the Department of Education and Skills. The Authority is responsible for planning, developing and funding higher education and research in Ireland. While the majority of the HEIs in Ireland (universities and colleges) are state funded, they remain autonomous in their nature under the current system. For example, application to HEIs is done through a central

214 The reviews of Irish HEI are available at http://qsearch.qqi.ie/

215 http://www.qqi.ie/Publications/White Paper - Policy on Monitoring.pdf

organisation, but the universities keep their right to make the final decision regarding the students they accept.

Trends show that the need for higher education in Ireland is increasing. For example, since 1960 the participation rates in higher education have increased by an average of 2% per annum[216]. Predictions done by Department of Education and Skills show that the increase will also continue in the near future. At the same time State funding for the education sector has declined by 25% between 2009 and 2014. This gap between increased demand and reduced funding has brought forward concerns about keeping up the quality of education and general outcomes. Hence, a need for reforms has emerged.

In 2012 the Quality and Qualifications Ireland (QQI) was established. The authority brought more focus to the quality of higher and further education in the country. A 10-level National Framework of Qualifications (NFQ) was created, to give good quality academic or vocational value to qualifications received from the Irish HEI. The authority also conducts regular reviews of the institutions and programmes they offer. Since 2014 annual performance reviews of Ireland's higher education system are undertaken.

Reforms in the funding system of HEIs are being developed as well. In the near future the institutions will start receiving part of their funding based on performance as well as strategic goals of the country. Moreover, the proposed changes will be supported by the planned legislative changes.

Performance of the Irish HEI system

Ireland's higher education system is performing very well according to the currently available statistics and has been considered to be one of the success factors leading to economic growth.[217] This statement is supported by the findings of the first ever performance review of Ireland's higher education system published in 2014 by the Higher Education Authority. The HEA concluded, that amongst other performance indicators of the system

- 50% of 30-34 year olds now have third level qualifications, which is the highest level in Europe;
- Irish universities are in the top 1 per cent of research institutions in the world across 18 academic disciplines;
- Ireland is the 1st in the world for the availability of skilled labour;
- Ireland has the 4th highest percentage of Maths, Science and Computing graduates in the EU;
- 75% of Irish employers are satisfied with graduate skills.

The next sections will provide more key statistics and findings about the system performance covering education, research, third mission as well as cost effectiveness over last 5 years to explain the success story behind Irish higher education system.

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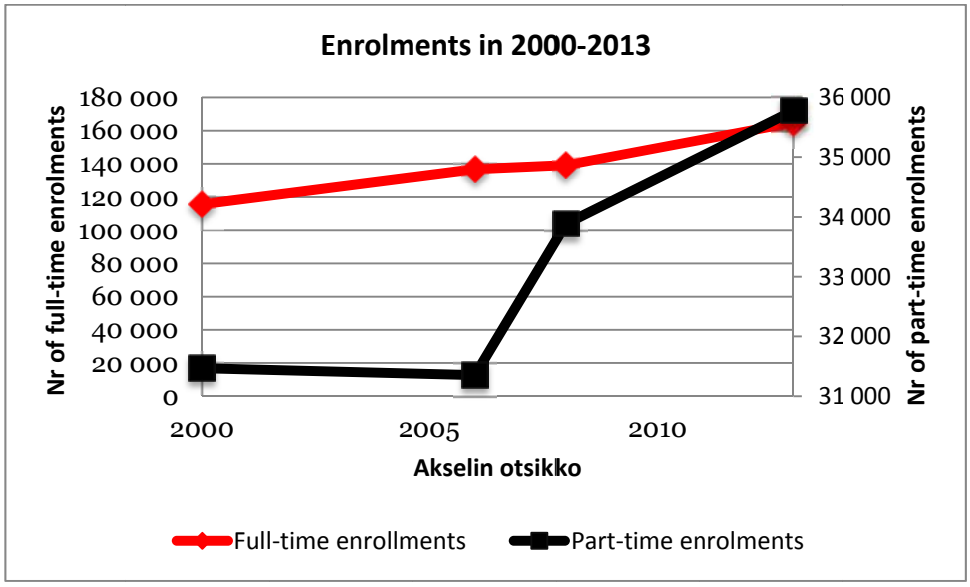
[216] OECD (2006). Higher Education in Ireland.

[217] Experts interviewed for this case study expressed their concern that due to the data availability lag (last statistics are from 2010) the good performance is no longer entirely true. As the funding has been reduced a lot in the last five years, the performance indicators must have also decreased. Most up-to-date statistics will be available in 2015.

C.7 Education

The prerequisite to **access higher education** is graduation from upper secondary programmes designed to prepare students for tertiary education (ISCED 3A). In Ireland the graduation rate from these programmes has remained high over the past years (97% in 2012), while the entry rate to higher education has been around half (54% in 2012).[218]

Figure 45. Full-time (left) and part-time (right) enrolments in the Irish HE system between 2000–2012

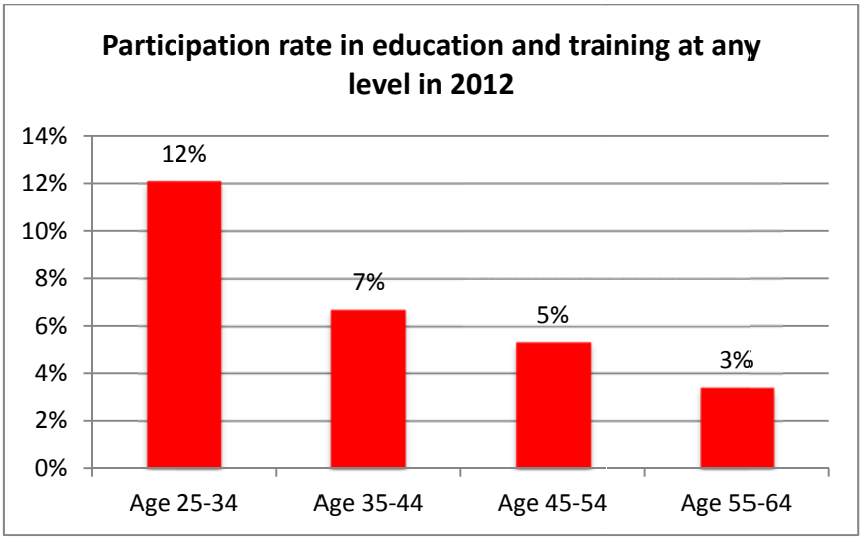


Source: Department of Education and Skills statistical database

The university participation has increased both full-time as well as part-time over the years as can be seen from the figure above. This is one of the major causes for a change in the higher education sector in Ireland. In the academic year of 2012/2013 there were 202,504 students enrolled in the higher education institutions in Ireland, of whom 50.9% were women. A majority of enrolled students studied at the universities (53%) and Institutes of Technology (41%), while only 4% were enrolled in other types of colleges. Most of the enrolled students participated in their studies full-time (81.2%), less part-time (17.4%) and on distance (1.4%). The number of new entrants to full-time undergraduate studies was 41,413 pupils, of whom 94% were from Ireland. As can be seen from the figure below, the participation rate is the highest amongst the age group 25-34 and decreases with increased age.

[218] OECD (2012). Education at a Glance.

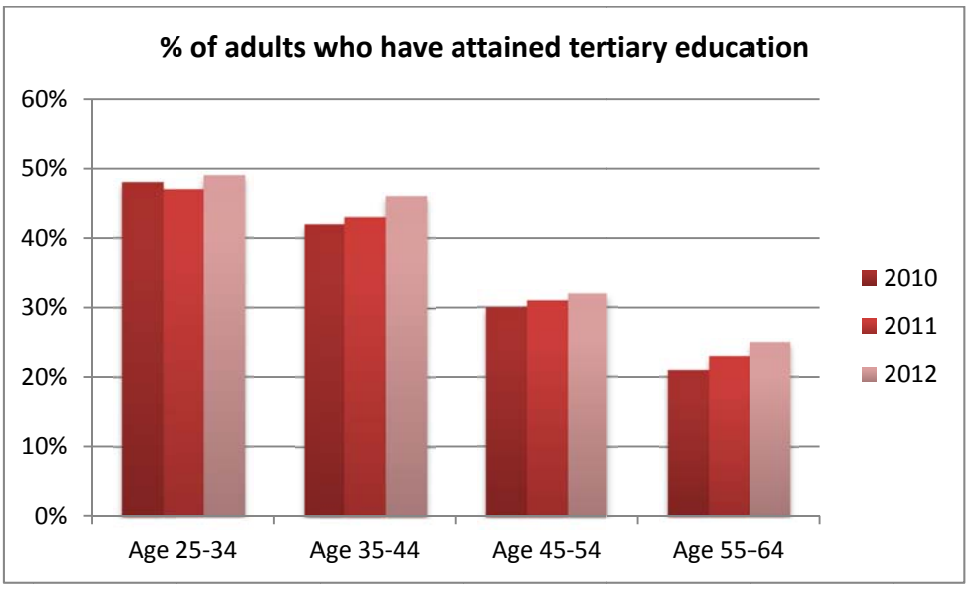
Figure 46. Participation rate in education and training at any level in the last 4 weeks



Source: Eurostat

In 2013 Ireland showed the best **graduation** rates in Europe. 52.6% of the population aged 30-34 attained tertiary education. It can be seen from the figure below that the share of adults who have attained higher education has increased in all age groups in Ireland over the years.

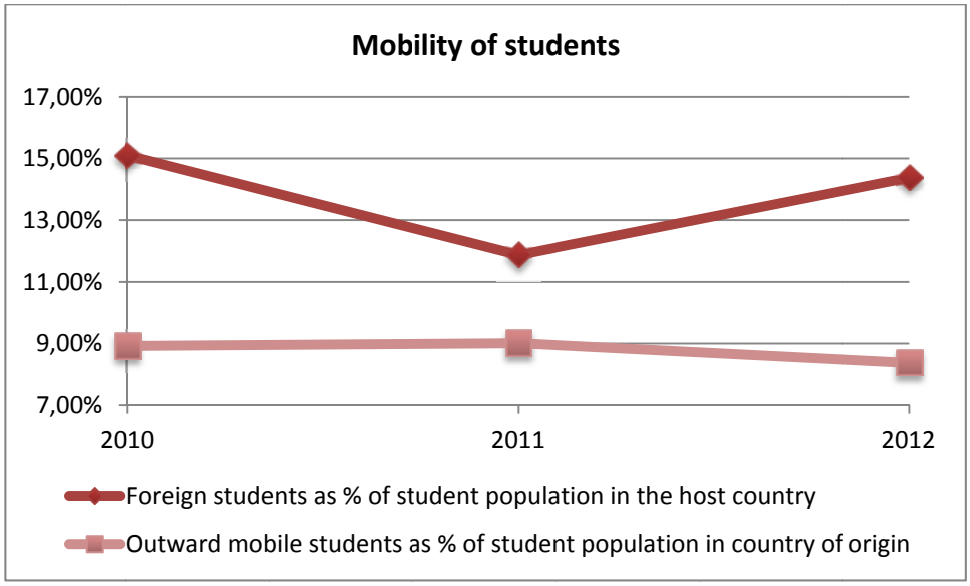
Figure 47. Percentage of adults who have attained tertiary education in different age groups



Source: Eurostat

Similarly, Ireland's performance in terms of **student mobility** over the years has also been relatively high. The outward and inward mobility have been rather stable as can be seen from the graph below; around 9% and 15% respectively.

Figure 48. Student outward and inward mobility 2010–2012



Source: Eurostat

According to Eurostat the **employability** of people with higher education has remained around 80% over the last 5 years (80.2% in 2014), while the employability of people with upper secondary and post-secondary non-tertiary has been around 60% (62.3% in 2014). People with less than primary, primary and lower secondary have an employability rate of around 35% (33.6% in 2014). Moreover, the median income is strongly influenced by the education level, even though it has dropped in all groups over the last years.

C.8 Research

The national target for Gross Domestic Expenditure on R&D (GERD) for Ireland is 2%, which has not yet been reached (see Figure 49). As the GDP for Ireland has decreased over the last years, the actual money received by the HEIs has in fact declined. As a result, the various research outputs shown in the table below have slightly declined.

The number of publications was 71,395 in 2011, while international collaborations as a percentage of scientific publications was 47.62%[219]. 14.95% of the articles were labelled as excellent[220] in the same year. Irish universities are in the top 1 per cent of research institutions in the world across 18 academic disciplines.

[219] OECD (2013). Science, Technology and Industry Scoreboard.

[220] Share of the publications that are "top-cited publications" (10% most cited papers in each scientific field).

Figure 49 Research output indicators for Ireland for years 2009–2012

Research output indicator	2009	2010	2011	2012
Gross domestic expenditure on R&D (GERD)	1.69%	1.69%	1.66%	1.72%
Patent applications to the EPO per million inhabitants	74.45	68.49	66.99	65.52
No of patent applications to the EPO	336.63	311.61	306.22	300.24

Source: Eurostat, OECD STIS 2013

Despite the overall good performance of the higher education system, only one university in Ireland reached the top 100 in university rankings. Trinity College Dublin was the only Irish university listed in the QS ranking in 2014. However, different ranking systems have been widely criticised by academic circles, as they tend to focus too much on specific variables. The Minister for Education and Skills commented that instead of focusing on individual institutional performance, the government needs to think about the performance of the system as a whole.[221] In this regard, the "strategic dialogue" process is viewed as a key instrument in maintaining a national or system focus, rather than an individual institutional one.

Total EU contribution to Irish research was €621.46m and the total number of participants in FP7 between 2007 and 2014 was 1,939 in 2014. In terms of budget shares, Ireland ranked 13th of all EU28 countries.

C.9 Third mission

Ireland has been in pursuit of 'knowledge-based' economy and lately the 'smart' economy, through different mechanisms. This involved funding higher education research mainly in Science, Technology, Engineering and Mathematics (STEM) areas, as well as encouraging diffusion of knowledge through technology transfer, commercialisation and patenting of discoveries. As a result Ireland has the 4th highest percentage of Maths, Science and Computing graduates in the EU.

Funding agencies, cycles and programmes which have been part of this process included Science Foundation Ireland (SFI), the Programme for Research in Third Level Institutions (PRTLI), Enterprise Ireland, IDA, the Health Research Board, HEA, the Irish Research Council for Humanities and Social Sciences, and the Irish Research Council for Science, Engineering and Technology (these last two now comprise the Irish Research Council). More generally, in the year 2011 alone, the Irish state allocated over €900 million for research through programmes implemented by different agencies.

C.10 Cost effectiveness

State funding for the education sector has declined in recent years, with a particular reduction on higher education funding. As outlined in Figure 50, the total funding for higher education declined by approximately 25% from €2.05 billion in 2009 to €1.5 billion in 2014. However, the overall share of public money out of the total funding for higher education in Ireland is significantly above the OECD average: in 2010 it was 81%, while the OECD average was 68%.

[221] Hazelkorn, E. (2013) op.cit.

Figure 50 Funding of higher education 2009- 2014

	2009	2010	2011	2012	2013	2014
Current	€1.849m	€1.776m	€1.688m	€1.591m	€1.533m	€1.467m
Capital	€201,000	€164,000	€79,000	€56,000	€60,000	€35,000
Total	€2.05b	€1.94b	€1.767b	€1.647b	€1.593b	€1.502b

Source: Delaney and Healy (2014)

In the period, core expenditure per student declined by 15%, with a reduction of almost 2,000 in staff numbers. As a result the staff-student ratio declined from 1:15 to 1:16 (a norm in the OECD countries) to 1:19.5. At the same time there has been severely limited investment in capital infrastructure, including maintenance – this in the context where already back in 2010 the HEA has concluded that about 41% of the existing space is not of appropriate standard.

Nonetheless, the information presented above is not the whole story as more and more money to HEIs come from other sources. In 2011, the total funding for universities and institutes of technology was contributed by state grants (27.5%), tuition fees from overseas students (31.2%), research grants (17.3%) and other income (23.9%). The total income of the sector increased by 6.7% from €2.45 billion to €2.61 billion between 2007 and 2011. This was mainly due to the increased income from tuition fees and other income.[222]

Another potential source of funding is the private sector. In summer 2014 India‘s richest company – Tata Group – announced that Ireland is one of the strongest contenders (another one is Canada) for Tata‘s plans to create and sell online courses based on Irish universities' curriculum into the US market (where the concept is most advanced but a lead provider has not yet emerged) as well as Ireland‘s and India‘s global diaspora. If this deal comes through Irish universities will „earn millions“.[223]

C.11 Conclusions

Ireland has the highest share of 30-34 year olds in Europe with third level qualifications. The access to education is good, as most of the tertiary education is publically funded and free of tuition fees for students (except for the overseas students). Over the last six years, the higher education system in Ireland has delivered 25,000 extra student places. This was done as a response to the increased demand induced by school leavers as well as increased number of unemployed people during recession, looking for ways for up-skilling in order to return to the labour market.

[222] Grant Thornton (2014). A Changing Landscape – Review of the financial health of the Irish Higher Education sector.

[223] http://www.independent.ie/business/irish/indian-giant-gives-lifeline-to-struggling-universities-30784484.html

Ireland is the 1st in the world with respect to availability of skilled labour. The Irish higher education system has been effective in responding to the needs of the labour market via supplying the right graduates with good mix of discipline-specific and employability skills. The provision of up-skilling, retraining and targeted skills places remains strong. The survey done amongst the employers concluded that employer satisfaction is high and graduate employment outcomes have recovered to pre-crisis levels. Moreover, the data on salaries as well as employment rates show that people with higher education have a strong advantage compared to those without tertiary education.

The research output indicators have slightly deceased in recent years, as less public funding is available for science. Despite these limitations, international performance of the Irish system is good according to the current statistics. However, there is a huge lag in data availability. The OECD data reports on the situation up until 2010. Hence, the results of the reduced funding will only show up in figures coming up next year onwards. Only then will a true picture of how the Irish higher education sector has been affected in crisis appear.

Only one institution (Trinity College Dublin) made it to the top 100 in the major university rankings. Irish universities are still in the top 1% of research institutions in the world across 18 academic disciplines. This shows that the country focuses on overall system performance, not just single institutions. In search for knowledge-based smart economy, the state has been funding more higher education research in Science, Technology, Engineering and Mathematics (STEM) areas, as well as encouraging diffusion of knowledge through technology transfer, commercialisation and patenting of discoveries.

This level of performance has been achieved against a backdrop of national economic crisis with a consequent reduction in public resources, which decreased by 25% between 2009 and 2014. Thus, funding of HEIs is rather constrained at the moment. All the sources of capital investment have been reduced. The number of students increased but not only because people wanted to study but also as a way to keep people off the unemployment benefits (thus taking off this financial burden from the State). Funding per student has been decreased over the last five years and is at the moment at €6,000-8,000 per student.

In the future is very likely that the number of staff at the HEIs will be reduced as the whole system is being stripped down to reduce costs. Having said that the sector itself does not see change in staff numbers in the same light. Staff mobility makes it a more positive picture – Irish researchers move from Ireland to other countries (mostly to the UK). However, there are certain difficulties with this mobility. There are conditions for individual students to move and individual institutions can offer their services. When it comes to an individual academic, however, it is pretty difficult for him or her to move given legal requirements for work and working conditions. Once the system is more flexible, it will make individual movements easier.

There are only two ways of funding the system – from the State and from students. It is very unlikely that the Irish system can develop an endowment culture (which is a powerful funding strength in the USA) where large volumes of funding can be secured from private companies or via commercialisation activities. Graduate taxes is another option but this is rather political and will take long time to materialise; besides, it usually does not work as people leave the country. All these various additional funding streams are possible but not to the level where they can replace a substantial part of institutional funding.

Another issue related to the HEI funding is that it is spread over several government departments. HEA provides an informal environment where all these various stakeholders interact and acts as an interface.

The gap between increased demand for higher education and reduced public funding has brought about need for reforms in the higher education system as there is increasing concern for potential drop in quality of graduates and outcomes generally,

if the situation continues. Hence, the Irish higher education system is currently undergoing several structural reforms. It includes merging institutions and developing clusters of collaboration to enhance quality of outcomes and create scale, in order to develop a more coherent system of HEIs, working together to deliver on national economic utilitarian objectives.

HEI policies and trends

C.12 National policies

As part of the governance shift in higher education, governments are increasingly taking interest in the quality and standards of HEIs. Quality has become "increasingly government-driven rather than institution-led"[224] and in Ireland there is no difference in this matter. Thus, national policies regarding the higher education sector are strongly looking for ways to maintain or even improve the performance of the higher education system. Being part of the EU, national policies in Ireland are strongly influenced by the European level policies in the areas of education and research.

The **Bologna Process** brought many reforms to the higher education system in Europe. Ireland is one of the countries credited with the most comprehensive implementation of the Bologna Process, including its quality assurance mechanisms that are in accordance with international best practice.

European countries are currently expected to develop their own **National or Regional Research and Innovation Strategies for Smart Specialisation**. Ireland initiated a National Research Prioritisation Exercise in 2010 and published the Report of the Research Prioritisation Steering Group in 2012. In Ireland's Smart Specialisation Strategy for Research and Innovation, 14 priority areas have been chosen and the implementation strategy was established in the Action Plans published in July 2013. More so, an international review of this strategy was held in summer of 2014.

At the national level the **National Development Plan for 2007–2013**[225] planned the largest and most ambitious investment programme to date in Ireland, contributing €25.8 billion for investments in schools, training and higher education. Despite the ambitious plans, the funding was in reality actually decreased and promotions blocked due to economic recession.

Another important strategy for the Irish higher education sector is the **National Strategy for Higher Education to 2030**[226] (also known as the Hunt Report) published in 2011. The Strategy makes 26 recommendations aimed at altering the structure of the system, its governance and funding, and the role higher education plays in teaching, research and engagement with society. It identifies and suggest ways to lessen the main pressures in the Irish higher education system:

- Increased demand for places – both full-time and part-time – over the next fifteen years
- Resource implications of the commitment to quality in teaching, research and scholarship, and cost implications of fulfilling such a commitment

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[224] Oireachtas Library & Research Service (2014). Higher education in Ireland: for economy and society?, Spotlight, pages 1-16.

[225] https://www2.ul.ie/pdf/932500843.pdf

[226] http://www.education.ie/en/Publications/Policy-Reports/National-Strategy-for-Higher-Education-2030.pdf

- Resource implications of the commitment to maintain the physical infrastructure of the institutions and the growing need for space resulting from projected increased demand

The report proposes the reform of both the governing authorities of individual institutions and the Higher Education Authority. It also proposes the development of a framework for collaboration between institutions, and in some cases consolidation and amalgamation (i.e. merging Institutes of Technology). Moreover, regarding financial sustainability, it suggests introduction of measures such as changing academic contracts and associated human resource aspects such as pay, staff consultation and maintenance of balanced budgets, as well as establishing some form of student loan system to make the financing of higher education sustainable. It finally suggests development of service level agreements for HEIs establishing key outputs, outcomes, levels of service and resources allocated to achieve them.

As a result of various factors mentioned earlier, the Irish higher education system is undergoing large reforms at the moment. This reform was announced by the Minister for Education and Skills in May 2013 and followed previously received recommendations from the Higher Education Authority.[227] The current Programme for Government echoes much of the content of the National Strategy for Higher Education to 2030.

Currently a new system performance framework is being put in place by the HEA based on key system objectives and indicators noted by the Government. In the next stage of implementation of the framework the HEA will enter into a set of individual institutional performance contracts with higher education institutions which will reflect each institution's contribution as part of a new higher education system designed to respond to the needs of Ireland's economy and wider society in the coming years. A key element in the overall approach will be the implementation of performance funding in the sector.

More so, certain changes to the quality assurance system will need to take place. According to the expert interviewed for this case study during the last European Quality Assurance Forum (which took place this autumn in Barcelona) it was discussed that there are a number of key things that need to be improved in the quality assurance in the future. The Irish legislation requires HEIs to take responsibility for their own quality; put process in place for quality assurance; evaluate their own departments and programmes and publish the results of this evaluation. The QQI's role should be about investigating how recommendations of internal reviews are being taking forward on the institutional level. The national assessment agency should serve as a guiding light, as a Forum with national guidelines of good practice.

C.13 Institutional policies

According to the European University Association the institutional autonomy in Ireland is rated consistently high in all four dimensions: 6th in organisational autonomy, 11th in staffing autonomy, 1st in academic autonomy and 12th in financial autonomy, in Europe. Ireland is in the "high" group in the first three categories and in the "medium high" in the financial category.

Nevertheless, the **universities**' capacity to freely use their public funds is somewhat constrained in Ireland. Surpluses cannot be kept and money can only be borrowed up to a maximum percentage. Universities may freely charge fees for all student groups except for national and EU students at Bachelor level. For the latter, a substantial yearly service charge is applied instead. The ministry's influence on universities has recently increased, mainly due to the austerity measures introduced by the central

[227] http://www.education.ie/en/Publications/Policy-Reports/HEA-Report-to-the-Minister-for-Education-and-Skills-on-Irish-higher-education.pdf

government. More generally, the limited availability of private funds is also considered to limit institutional autonomy.

Each university has a Strategic Plan that gives the specific research policy of that institution in terms of research areas, infrastructure and career development. Collectively, the universities develop common research policy through the Vice Presidents and Deans of Research Group. Moreover, the universities have independent Teaching and Learning Strategic Plans. All the institutional strategies need to be in coherence with the national strategies.

While the term for executive head is legally set at ten years, there are no additional regulations regarding the position. The appointment procedures for external members of the senate are, however, laid down in the law in great detail and for each institution.

Salary limits are centrally set for senior academic and administrative staff. Staffing autonomy has also been strongly affected by the economic crisis. In 2009 the government instituted a moratorium on recruitments and promotions in the public sector which applied to higher education institutions and was renewed in 2011. With no notable restrictions being imposed on the universities' academic freedom, Ireland is the strongest higher education system in Europe in this dimension.

The **Institutes of Technology** achieved similar institutional autonomy, improved governance and a statutory guarantee of academic freedom as the universities have with the approval of the Institutes of Technology Act 2006. Currently some mergers between Institutes of Technologies are expected to create a stronger institution. Some of the Institutes are aspiring to become universities.

According to the experts interviewed for this case study, the main concern regarding the potential reforms mentioned above is with the regard to the focus of the Institutes of Technology. It is not clear that they will be able to maintain their (technical) focus once they get university status.

Another concern is whether the Institutes will manage to change/adjust the profiles of their staff to truly act as research-intensive institutions, which a university is. Historically, the Institutes focused on education with staff having higher-class contact hours (e.g. 18-20 hours/week). The shift to university status would mean that these employees would have to do research. There are two crucial questions deriving from this:

- Will that affect teaching hours?
- Do current employees have the necessary skills to do research as the Institutes historically did not have requirements for their personnel to have a strong research background?

The authorities do not oppose a change of status as such but emphasise that certain hurdles need to be overcome. Introducing such a change into the system needs to be considered carefully. The UK experience of turning polytechnics into universities[228] showed that although some institutions became a bit stronger, the majority did not, on the opposite, it devalued their degrees. There is also a thought that some courses currently offered by the Institutes of Technology would be downgraded and be offered by the further education colleges.

Employers are generally happy about the quality of graduates, although this does not mean that this is the same as labour market needs. Employers get broadly trained people with good perspective and who can be further trained on the job. The IOTs prepared people more tuned to the industry needs and it is crucial to maintain this in the future.

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[228] Zhang, Qiantao; Larkin, Charles J; Lucey, Brian M (2014). The Economic Impact of Higher Education Institutions in Ireland: Evidence from Disaggregated Input Output Tables.

The perception at the moment is that universities are rather theoretical whereas the Institutes are 'digging into the soil'. What is missing and needed is something in between. The idea is that by having better education and practically equipped people, it will be easier to attract multinational companies to Ireland. However, what is often forgotten is that multinationals are not that generous in funding education and/or research and are usually attracted to countries like Ireland by the favourable tax policy and not the quality of research.

Ireland is following a mass education policy. About 60% of school leavers continue to the HEIs. The objective (later abandoned) was to have 72% participation of school leavers. What is not clear and no data are currently available is what is a tipping point in a debate about number of students vs. quality of studies. Does it make sense for two-thirds of the school leavers' population to be in further education? There are of course various cultural and political considerations to be taken into account but, nevertheless, there are no data available to answer this fundamental question of quantity vs. quality.

Conclusions

Ireland has a binary higher education system. There are publically funded universities, Institutes of Technology, colleges of education and some private colleges. The governance of the sector is the main responsibility of the ministry (Department of Education and Skills) and the Higher Education Authority (HEA). The intermediary authorities include Central Applications Office (CAO) and the Postgraduate Application Centre (PAC), which are responsible for HEI application processing and HEAs local information offices. Science Foundation Ireland (SFI) is the responsible authority of quality assurance in the research sector and the Quality and Qualifications Ireland (QQI) in the higher education sector.

The main laws and regulations governing higher education in Ireland are:

- Irish Universities Act 1997 which sets the out the objects and functions of a university, the structure and role of governing bodies, staffing arrangements, composition and role of academic councils and sections related to property, finance and reporting
- Institutes of Technology Act 2006 which sets out the same aspects for the Institutes of Technology as the previous act does for the universities
- Qualifications and Quality Assurance (Education and Training) Act 2012 which created the Qualifications and Quality Ireland to enhance the performance of the HE system.

There are three different types of public funding distributed to the HEIs in Ireland: institutional funding (recurrent grant funding), capital funding (for infrastructure) and research funding. Ireland is moving towards funding models that are based more on performance and quality and for that the Recurrent Grant Allocation Model is being developed. Establishment of the National Framework of Qualifications (NFQ) is one step towards that.

The Irish higher education system has been performing exceptionally well in a European context so far according to the currently available statistics (with the latest sets being available for the year 2010). For example, Ireland has the highest share of 30-34 year olds in Europe with third level qualifications, and a great access rate to third level education. Also, satisfaction amongst the employers on graduate skills is high and the graduate salary levels reflect that higher education is valued in the Irish society.

When looking at research indicators it must be kept in mind that data availability lag brings bias and discrepancy into this analysis. The OECD data reports the situation up until 2010, thus not showing the trends during the crisis. According to the experts interviewed the actual performance after the crisis is less good due to drastically decreased public funding (which decreased by 25% between 2009 and 2014) compared to the impression given by the figures currently available. In the light of harsh reality of less funding available and considering that the demand for higher education is still increasing, the system is in need of a change. The higher education system in Ireland is no longer sustainable as the quality of graduates and general outcomes are starting to suffer.

In accordance with the EU policies Ireland is working on its Strategies for Smart Specialisation to allocate research funding more wisely. In the education sector the National Development Plan for 2007–2013 promised ambitious investments in the sector, but due to the crisis not all of them happened. Newer National Strategy for Higher Education to 2030 sets several reform plans including creation of new sustainable funding models, institutional reforms (both HEI and HEA), development of clusters of collaboration and merging some of the Institutes of Technology.

On an institutional level some of the Institutes of Technology are aspiring to become universities in the light of lack of funding to gain access to additional research funding. This change of status will possibly bring several problems. First, it is not clear that IOTs will be able to maintain their (technical) focus once they get university status. Second, it is doubtful if the Institutes will manage to change/adjust the profiles of their staff to truly act as research-intensive institutions, which a university is. The UK experience of turning polytechnics into universities showed that although some institutions became a bit stronger, the majority did not. Moreover, some IOTs are planning to merge, to have a stronger institutional performance. In these cases the regional coverage by these institutions needs to be ensured.

Appendix D Benchmark case study: The Netherlands

Derek Jan Fikkers

Structure and characteristics of the HEI system

D.1 Main characteristics of the HEI system

The Netherlands has a binary HEI system that consists of 37 state funded colleges and 14 state funded universities. Together they run a three-cycle degree system, consisting of bachelor's, master's and PhD degrees. The colleges in The Netherlands are referred to as *Hoger Beroeps Onderwijs* (higher professional education, HBO). There are a total of 37 state funded colleges in The Netherlands. They include general colleges as well as colleges specialising in a specific domain such as agriculture, fine and performing arts or teacher training. At this moment the Dutch colleges host over 420,000 students and employ over 40,000 staff members. The colleges have increased significantly in size since the mid-1990's, due to increasing student inflows, but especially due to large numbers of subsequent mergers. The 14 universities house a total of 240,000 students. Almost half of the Dutch universities (6) are referred to as general universities, as they offer the full range of disciplines. Three universities are specialised in terms of discipline, focussing on either technology, or on food, health and agriculture. One university is specialised in distance education for 'lifelong learning'. All fourteen universities offer graduate and undergraduate education.

Both the colleges and the universities are publicly funded. Block funding is largely provided for by the Ministry of Education, Culture and Science (OCW). In this binary system bachelor's, master's and PhD degrees are awarded. Short-cycle higher education leading to the associate degree is increasingly being offered by the Colleges. Degree programmes and periods of study are quantified in terms of the ECTS credit system.[229]

D.2 Main actors in the HEI system

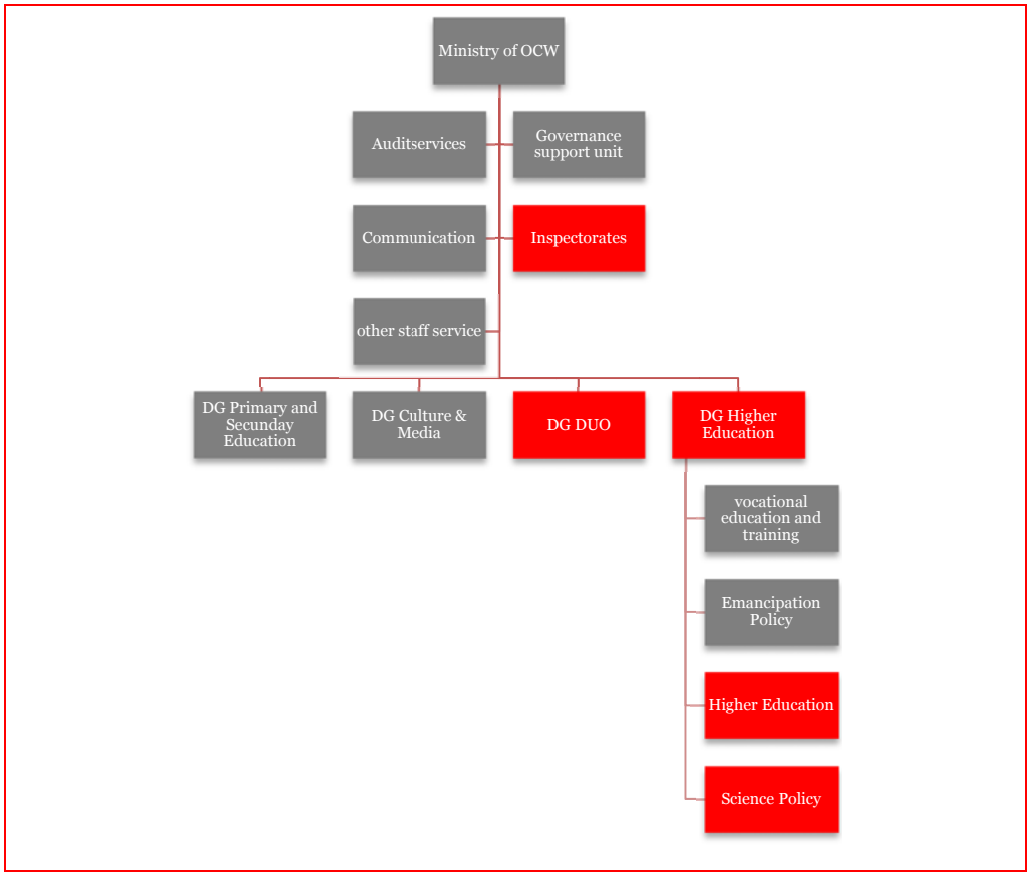
D.2.1 Responsible Ministry (Ministries)

The Ministry of Education, Culture and Science (OCW) is the responsible ministry for higher education in The Netherlands. The Ministry aims to "create a smart, skilled and creative environment in the Netherlands. Its mission is to ensure that everyone gets a good education and is prepared for responsibility and independence. The Ministry also wants people to enjoy the arts, and aims to create the right conditions for teachers, artists and researchers to do their work."[230] It is designed as presented in Figure 51. The red units are directly relevant for the HEI system. The grey units have no direct relationships with the system or have only an indirect relationship.

[229] Source: Nuffic

[230] http://www.government.nl/ministries/ocw

Figure 51 Organisation of the Ministry of Education, Culture and Science (OCW).



Source: Ministry of Education,, Culture and Sciences

The Directorate General DUO is responsible for the administrative agency *Dienst Uitvoering Onderwijs (*DUO). This agency is responsible for e.g. student grants and information management. The Directorate General Higher Education consists of four directorates. Only two of them are directly relevant for the Dutch Higher Education System. These are the Directorate Higher Education & Student and the Directorate Science Policy. The first directorate focuses on e.g. higher education participation, graduation rates; student motivation issues; programme quality; and internationalisation. The Directorate Science Policy coordinates Dutch science policy over several departments, and is responsible for international science policy in The Netherlands.[231] The Dutch Inspectorate of Education has a role in the higher education system that is described in Section D.2.4 .

D.2.2 Universities, Colleges and public research institutes

There are fourteen universities in The Netherlands, and 38 state-funded colleges. The fourteen universities offer ISCED[232] levels 6 (in three year programmes), 7 and 8. They are the only institutions that can offer funded tracks at level 7, and they are the only institutions that have the *ius promovendi* to offer level 8 tracks. The universities are distributed over the country though there is a strong concentration in the densely populated Randstad Region (cf. Figure 4). Six of the fourteen universities (Radboud University Nijmegen; Leiden University; University of Amsterdam; Free University

[231] Cf. Website of Ministerie van Onderwijs, Cultuur en Wetenschap (minocw.nl).

[232] International Standard Classification of Education.

Amsterdam; University of Groningen; Utrecht University) are labelled general universities or classical universities. That implies that they cover basically all domains. In addition to that, there is a total of three universities (TU Delft; Universiteit Twente; Technische Universiteit Eindhoven) that only cover the exact sciences domain. There have been discussion about mergers of these universities for some years, yet without concrete results. One university (Wageningen University) primarily covers agriculture educations. Three universities (University of Maastricht; Erasmus University Rotterdam; and Tilburg University) focus on humanities.

The fourteen Dutch universities offer a total of 422 BA programmes, and a total of 964 MA programmes.[233] Both numbers are about three to four times as high as the Finnish numbers. The Dutch universities have a total of 160,000 BA students, and a total of 85,000 MA students.[234]

The 37 colleges offer ISCED levels 6 (in four year programmes) and indirectly also 7. They do so be acting as an employer for young researchers tot in parallel have a PhD tenure at one of the 14 universities. The 37 colleges are referred to in The Netherlands as *Hogescholen*. In systems terms they are referred to as *Hoger Beroepsonderwijs* (HBO, Higher professional Education). Unlike the universities, the colleges are distributed over the country more evenly, which is a clear result of their role in the regional labour markets (cf. Figure 4). A substantial set of colleges are general in the sense that they offer a large variety of tracks. The colleges gave gone through significant changes in the last few decades. In the beginning of the 1980's the colleges could be described as a group of about 400 independent monosectoral schools, that were internally oriented and intensively supervised by the Ministry of Education, Culture and Sciences. Though an almost continuous series of mergers, combined with growing ambitions, and increased autonomy, the colleges have become a rather heterogeneous group of institutions that includes large general colleges, often with several locations or spokes. But this group also includes a large set of specialised colleges, many of them often art schools, or Christian schools.[235] In the public debate these mergers have often been associated with decreased performance in educational terms.

The 37 Dutch colleges offer over 1200 BA programmes, and over 300 MA programmes. [236] The Dutch colleges have a total of 421.000 students.[237]

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[233] Source: Vereniging Hogescholen, VSNU & NRTO via *Studiekeuze123.nl.*

[234] Source: VSNU.

[235] Leijnse, F. (2002), *Hoger onderwijs: Europees cultuurgoed in nationaal kleed*. Ward Leemans Lezing Katholieke Hogeschool Leuven; Riet, S.P. van 't (2013), *Slimmer in 2030. Geschiedenis en toekomst van het hoger onderwijs in Nederland*. Amster dam: VU University Press.

[236] Source: Vereniging Hogescholen, VSNU & NRTO via *Studiekeuze123.nl.*

[237] Source: DUO.

Figure 52 Distribution of the 14 universities (red) and 37 Colleges (grey) over the country.

Source: VSNU; Vereniging Hogescholen

Most basic research is being done in the universities, so the public research institutes capacity is small compared to that of countries such as Belgium, or Germany. Moreover, public research institutes' capacity is mainly focused on the higher Technology Readiness Level (TRL) scales. These institutes include e.g. TNO; Deltares; Energieonderzoekscentrum Nederland (ECN); Maritiem Research Instituut Nederland (MARIN), The National Aerospace Laboratory (NLR) en Stichting DLO). The colleges are beginning to build research capacities, in which they are inspires especially by the German Colleges. Therefore they build Centres of Expertise and hire so-calles *lectors*.

The Netherlands Organisation for Scientific Research (NWO) is the research council in The Netherlands.[238] The organisation falls under the responsibility of the Ministry of Education, Culture and Science. It aims to advance the quality of scientific research and initiate and encourage new research developments; to allocate research funding; to facilitate the transfer of knowledge from research initiated and encouraged by NWO for the benefit of society; and to focus on university research and to coordinate scientific research strategy where necessary. NWO's Strategy Memorandum 'Growing through Knowledge' describes its vision as a research council and the role it sees for science. The colleges have their own research funder, called SIA. This is officially part of NWO.

D.2.3 Intermediary organisations

The list of organisations active in Dutch higher education is substantial. Here, we focus on organisations that are considered important actors by the Dutch Ministry of Education, Culture, and Sciences. These are the following:

- The Dutch Inspectorate of Education has a role in the higher education system that is described in section D.2.4 .

[238] www.nwo.nl

- Dienst Uitvoering Onderwijs (DUO). The DG that governs DUO is described in section D.2.1 . DUO itself arranges the evaluation of non-Dutch diplomas; student grants; student loans; student travel products; and drawing lots.[239]
- Nuffic is an important intermediary organisation that promotes international cooperation in higher education; manages programmes on the instruction of the Dutch government, the European Union and third parties; it provides information about Dutch and foreign higher education.[240] It it aims to strengthen the position and raising the profile of Dutch higher education and scientific research, and evaluates diplomas and promoting the transparency of education systems.[241]
- NVAO is an independent and authoritative accreditation organisation, whose primary goal it is to provide an expert and objective judgement of the quality of higher education in Flanders and the Netherlands. NVAO is described in section D.2.4 .
- The Commission of Functionality of the Higher Education (*Commissie Doelmatigheid Hoger Onderwijs*, CDHO) advise the Ministry of Education, Culture and Sciences on the added value of individual courses for Dutch society and economy.
- VSNU is the Association of universities in the Netherlands.[242] VSNU represents the universities to the government, Parliament, and governmental and civic organisations. In addition to that, VSNU also facilitates debate, and it develops and disseminates common positions held by its member universities. Moreover, VSNU is the employers' organisation, which means it has an important role vis-à-vis labour unions in the decision making on employment conditions in the university sector.
- The Vereniging Hogescholen is the association of the 37 Dutch colleges.[243] The association focuses on strengthening the position of colleges. To this end it maintains contacts with a broad range of people and organisations. Like the VSNU, the Vereniging Hogescholen also operates as the formal employers' organisation.

D.2.4 Main bodies for quality assessment / quality management and accreditation

The main body for accreditation in The Netherlands is the Accreditation Organisation of the Netherlands and Flanders (*Nederlands-Vlaamse Accreditatieorganisatie,* NVAO). NVAO is an independent and authoritative accreditation organisation. It was established by treaty between the Flemish government and the Dutch government to operate as an independent accreditation organisation. Basically, NVAO has three tasks in the Dutch higher education system: (1) assessing and assuring the quality of Dutch and Flemish higher education; (2) promoting the quality of higher education by promoting a culture of quality, aimed at regular assessment and continuous quality increase; and (3) putting Dutch and Flemish sectors of higher education (institutions, programmes) on the map and strengthening their position by means of international cooperation.[244] Its role is presented in section D.2.6 . In addition to the NVAO, the Dutch Inspectorate of Education (that was presented in section D.2.1) also has a clear role in quality assessment. This role can be described as 'meta evaluator', and is presented in detail in section D.2.6 .

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[239] https://duo.nl/particulieren/international-student/default.asp

[240] Michael Gaebel et al. *Internationalisation in European higher education*. EUA/ACA.

[241] Nuffic (2010). *Link Int!: Strategic framework 2010.*

[242] www.vsnu.nl

[243] www.verenigingenhogescholen.nl

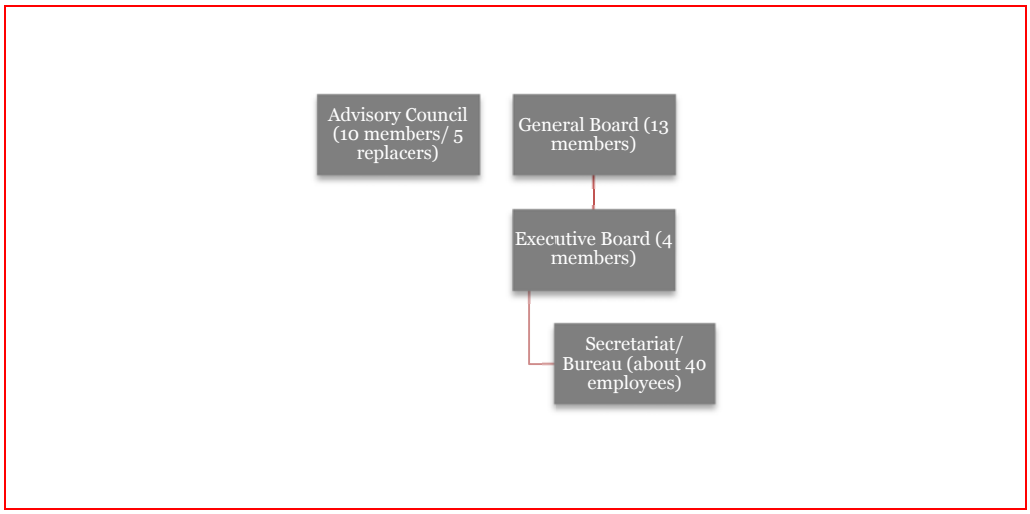
[244] NVAO (2012). Strategy NVAO 2012-2016.

The Quality Assurance Netherlands Universities (QANU) is an independent organisation that offers external assessments of academic education and research programmes. It also offers advice on ways of improving quality assurance procedures. QANU's services include peer review of university education and research, support for submission of applications for accreditation from universities in the Netherlands and abroad, and advice on improvement of internal quality assurance. QANU assesses scientific bachelor's and master's degree programmes on the basis of the frameworks developed and established by the NVAO. QANU uses the Standard Evaluation Protocol, a joint protocol of the VSNU, the Royal Academy of Science (KNAW) and the Netherlands Organisation for Scientific Research (NWO), as the starting point for its assessments of scientific research programmes.[245] This protocol is elaborated in section D.5 . Even though QANU was originally set up by the VSNU (and is nowadays independent), individual universities are not obliged to use QANU's expertise. The Vereniging Hogescholen has got its own quality mechanisms for the lectors that we identified earlier.

D.2.5 Organisation chart

The figure below presents the organisational chart of NVAO, which is also described in the previous section.

Figure 53 Organisational chart of the main body for quality assessment (NVAO)



source: NVAO

D.2.6 Roles and responsibilities

The primary goal of NVAO is to provide an expert and objective judgement of the quality of higher education in Flanders and the Netherlands. NVAO is supposed to do this "with a constructive, critical attitude, respecting the autonomy of institutions and their primary responsibility for the quality of their education, and with an open eye for the growing international context"[246] Both universities and colleges increasingly make use of the so-called '*Instellingstoets*'. This is a test that involves the entire institution, and not just a department.

The Dutch Inspectorate of Education also has a role that involves the supervision and the reporting on developments in higher education, including the accreditation system

[245] Source: ww.qanu.nl

[246] NVAO Treaty.

('meta accreditation'); maintaining checks and balances within (or in the environment of) institutions of higher education; and the supervision of financial compliance by higher education institutions.[247]

D.3 Acts and regulations

The most important act is the Law on Higher Education and Research (*Wet op het hoger onderwijs en wetenschappelijk onderzoek*, WHW) from 1992 and in addition to that in Law Quality in Diversification (*Kwaliteit in Verscheidenheid*, Law QiD). The latter is described in detail in section D.12 .

The changes in the law are described in detail in section D.12 .

D.4 Funding of HEIs

The table below presents some basic figures on system in which the Dutch HEIs operate. As in many countries, GDP growth has been low. As a consequence GERD as % of GDP (but also GERD in absolute figures) have risen. R&D funded by government has declined, while R&D funded by Business Enterprise Sector seem to be climbing. R&D performed by HEIs is stable.

Figure 54 Basic funding characteristics in the Dutch system (1/2)

	2009	2010	2011	2012	EU27
GDP growth rate	-3.7	1.5	0.9	-1.2	
GERD as % of GDP	1.82	1.86	2.03	2.16	2.06
GERD (euro per capita)	631.3	657.1	728.9	772.6	529
Total GBAORD as a % of total general government expenditure	1.65	1.61	1.67	1.54	90,333
R&D funded by Government (% of GDP)	0.74	na	0.72	na	0.7 (e)
R&D funded by Business Enterprise Sector (% of GDP)	0.82	na	1.01	na	1.30
R&D performed by HEIs (% of GERD)	0.73	0.75	0.67	0.7	23.7%
R&D performed by Government (% of GERD)	0.23	0.22	0.22	0.23	12.6%
R&D performed by Business Enterprise Sector (% of GERD)	0.85	0.89	1.14	1.22	63.1%

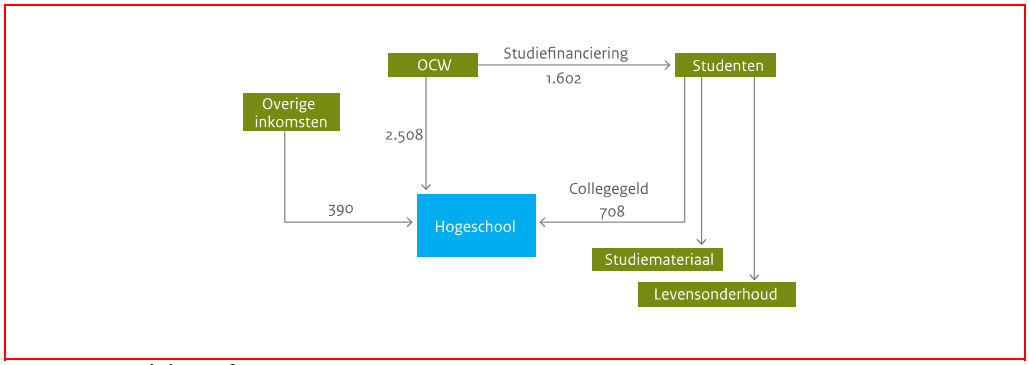
Source: Eurostat

Colleges in The Netherlands receive funding from three different sources. The Ministry of Education, Culture, and Sciences funds about €2,500 mln per annum. In addition to that tuition fees make up an additional €700 mln per annum. Additional sources are received up to €390 mln. This includes both additional government funding, and work done for third parties, mainly contract research, and contract education for industry. With regard to the governance of the colleges, the Ministry of

[247] The Inspectorate of Education in the Netherlands: Profile of the Inspectorate General.

Education, Sciences, and Culture is responsible for funding allocation, mainly on the merits of student numbers (80%) and graduation rates (10%). In addition to that, colleges receive extra funding when responding to specific policy targets set by the Ministry, including setting up research capacity and specialising (10%).[248] The lector positions that were mentioned earlier, as well as the Centres of Expertise, are the major results of these investments.

Figure 55 Main funding streams of the Dutch Colleges (mln €).



Source: Ministry of OCW

Universities in The Netherlands are subject to a more complex funding system. They receive funding from four different sources. They are referred to as funding streams. The institutional funding system is restricted to the first budget stream. The main funder here is the Ministry of Higher Education, Culture and Sciences, although the Ministry of Economic Affairs specifically funds the Wageningen University and Research Centre. The other streams are (semi-) competitive.

The first budget stream involves all lump sum government contributions that are used for the execution of all university tasks and activities. The lump sum size for the universities is formula based, and made operational in a funding model (*bekostigingsmodel*) that includes parameters in the figure below.[249] In addition to that, universities can receive extra funding for meeting certain output agreements that are referred to as *prestatieafspraken*. This can rise to 6%.

Figure 56 Main characteristics of the Dutch *bekostigingsmodel*.

Education	**Research**
# of students (60%)	*# MA Diplomas*
# of diplomas (20%)	*# PhD graduations*
Extra education related costs (20%)[250]	*Strategic considerations (58%)*
-	*Research Schools (7%)*
-	*Research related part (3)*

Source: Ministry of OCW

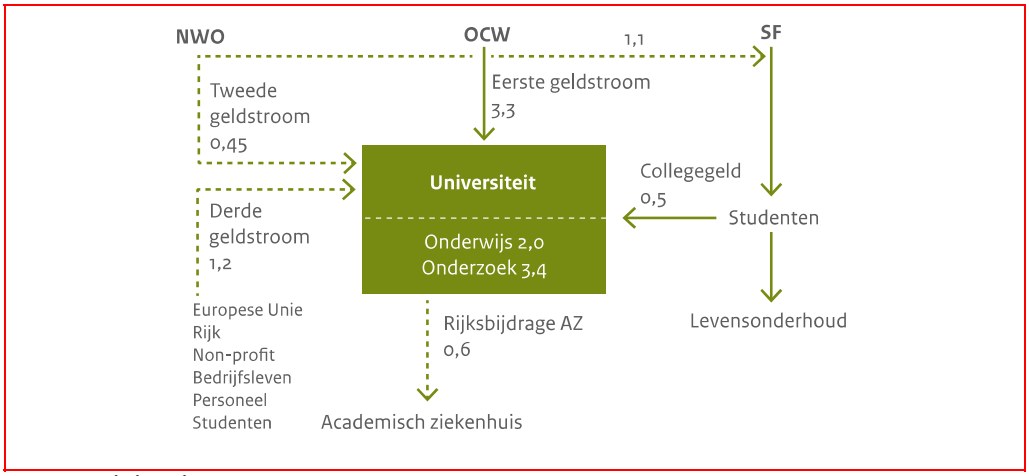
[248] Ministry of Education, Culture and Sciences (2014)/ Kerncijfers 2009-2013 onderwijs, cultuur en wetenschap.

[249] Ministry of Education, Culture, and Sciences (2012). *Het Nederlandse wetenschapssysteem – institutioneel overzicht*'. April 2012).

[250] *Onderwijsopslag.*

The second budget stream involves all means that the universities and colleges receive from the research funders NWO (including SIA for the colleges) and KNAW. For the universities these budgets are crucial, for colleges the income from the second budget stream is small. The third budget stream involves competitive funding (contract revenue) from third parties (public and private, national and international sources) for both education and research. Apart from that, universities and colleges in The Netherlands also receive funding from tuition fees, which we refer to as the fourth funding stream. They receive these directly from the students.[251] The second and the third budget streams have grown significantly in importance over the last decade and a half. Contributions from industry have for instance risen with 307% between 1999 and 2010. Income from abroad has risen with 299% in that same period, which is mainly due to increasing size of the Framework Programmes for research and innovation. The second and the third budget streams in general have seen a 220% increase in that period.[252] Several reasons can be identified. Several corporates have decrease their own basic research capacities, and increased investments in public private partnerships. Philips is a good example, as it abolished its *Natlab* that once hosted 2000 researchers that mainly worked on basic natural sciences. Nowadays, much if its research is outsourced. Government base funding has increased with 150% in that particular period.[253]

Figure 57 Main funding streams of the Dutch Universities (bln €).



Source: Ministerie van OCW

Changes in funding of HEIs have not been substantial. Public expenditures have risen over the last decade. R&D expenditures as % of GDP have risen dramatically since 2008, but mainly due to GDP decline. Solvability of the institutions has risen from 0.41 to 0.46 in the last four years. Profit-earning capacity (in %) has fallen from 3.9% to 1.7%. Income from tuition fees are expected to increase in the coming years, as there has been a period of deregulation in this respect. Universities and colleges are expected to strategically rise tuition fees.

[251] Ministry of Education, Culture and Sciences (2014)/ Kerncijfers 2009-2013 onderwijs, cultuur en wetenschap.

[252] Source: CBS.

[253] Source: CBS.

D.5 System of accreditation and quality control

D.5.1 System of accreditation: description of the organisation, which criteria?

The main body for accreditation in The Netherlands is the Accreditation Organisation of the Netherlands and Flanders (*Nederlands-Vlaamse Accreditatieorganisatie*, NVAO). In addition to the NVAO, the Dutch Inspectorate of Education (that was presented in section D.2.1) also has a clear role in quality assurance. This role can be described as 'meta evaluator'. The Quality Assurance Netherlands Universities (QANU) is an independent organisation that offers external assessments of academic education and research programmes. It sees its mission as follows:

Figure 58 Basic information on QANU

QANU conducts activities in the field of external quality assurance in higher education and research, commissioned by universities in the Netherlands: QANU organises and co-ordinates assessments of degree programmes and research programmes on the basis of formal frameworks established by the relevant authorities. QANU thus contributes to maintaining and further improving the quality of scientific education and research in the Netherlands and has, on the basis of its experience and expertise, a role and a position of its own in the system of external quality assurance in the Netherlands.

QANU assesses scientific bachelor's and master's degree programmes on the basis of the frameworks developed and established by the Accreditation Organisation of the Netherlands and Flanders (NVAO). QANU uses the Standard Evaluation Protocol 2003-2010 for Public Research Organisations (2003), a joint protocol of the VSNU, the Royal Academy of Science (KNAW) and the Netherlands Organization for Scientific Research (NWO), as the starting point for its assessments of scientific research programmes.

QANU is full member of ENQA, the European Association for Quality Assurance in Higher Education. QANU is included in EQAR, the European Quality Assurance Register for Higher Education.

Source: QANU

The relevant bodies of accreditation are described in detail in section D.2.4 and in section D.2.6 .

D.5.2 Quality control education: how is the system organised, who is responsible?

As was indicated in section D.2.4 , the main body for accreditation in The Netherlands is NVAO. NVAO is an independent and authoritative accreditation organisation that was established by treaty between the Flemish government and the Dutch government. NVAO has three responsibilities: (1) assessing and assuring the quality of Dutch and Flemish higher education; (2) promoting the quality of higher education by promoting a culture of quality, aimed at regular assessment and continuous quality increase; and (3) putting Dutch and Flemish sectors of higher education (institutions, programmes) on the map and strengthening their position by means of international cooperation. NVAO's activities are regulated by the Accreditation Treaty that states that "NVAO is an independent and authoritative accreditation organisation set up by the Dutch and Flemish governments, whose primary goal it is to provide an expert and objective judgement of the quality of higher education in Flanders and the Netherlands. NVAO does this with a constructive, critical attitude, respecting the autonomy of institutions and their primary responsibility for the quality of their education, and with an open eye for the growing international context"[254].

NVAO has always underlined the importance of independence. It stresses that it is neither the 'extended arm of the government' nor is it part of the sector of higher

[254] NVAO (2012). Strategy NVAO 2012-2016.

education. NVAO claims that its judgements have to be respected, "which means that institutions have to feel treated fairly, that the government has to be able to trust the outcomes of accreditation surveys, that students and society have to be able to trust the value of the accreditation judgements and that other parties (for instance foreign institutions and students) know that accredited programmes deliver what they promise".[255] In the past eight years NVAO has assessed over 4,000 programmes, and over 500 applications from HEIs.

D.5.3 Quality control research: how is the system organised, who is responsible?

The boards of the Royal Dutch Academy of Sciences (KNAW), the Netherlands Organisation for Scientific Research (NWO) and the executive boards of universities are responsible for the external evaluation of the research units under their authority. The KNAW, the NWO, and the VSNU have set up the so-called Standard Evaluation Protocol (SEP), which is the sixth protocol for evaluation of scientific research in the Netherlands. The SEP aims at two objectives with regard to the evaluation of research (including PhD training) and research management. The first one is the improvement of research quality based on an external peer review, including scientific and societal relevance of research, research policy and research management. The second one is the accountability to the board of the research organisation, and towards funding agencies, government and society at large. The SEP describes the methods used to assess research conducted at Dutch universities and NWO and Academy institutes every six years, as well as the aims of such assessments. These organisations have undertaken to assess all research conducted within their organisations between 2015 and 2021 in accordance with this SEP; the boards of the universities, NWO and the KNAW take responsibility for the assessments and following up on them within their own institutions. They are also responsible for assuring that every unit within their institution is assessed once every six years, for the overall scheduling of assessments at their institution, and for giving notice of pending and concluded assessments.[256]

Figure 59 The Standard Evaluation Protocol for research in actual practice

The rhythm of the SEP consists of a self-evaluation and an external review, including a site visit once every six years, and an internal mid-term review in between two external reviews. In the SEP, guidelines regarding assessment criteria, minimum information requirements and the procedure of the external review are formulated. After the site visit, the evaluation committee will report its findings to the board of the research organisation. The board will publish the report after internal discussion with the assessed research unit and will make its position regarding the evaluation outcomes public. The evaluation report and the position of the board together constitute the results of the evaluation.

The Standard Evaluation Protocol entails three main characteristics:

- Two levels of assessment: The assessment takes place at two levels of research organisation, i.e. the level of the institute (or faculty or research school) and the level of research groups or programmes.
- Three vital tasks: The assessment regards the three vital tasks of research organisations, i.e. producing results for the academic community, producing results that are relevant for society, and educating and training the next generation of researchers.
- Four main criteria: The assessment entails four main criteria, i.e. quality, productivity, relevance, and vitality & feasibility.

Sources: KNAW; NWO; VSNU.

[255] NVAO (2012). Strategy NVAO 2012-2016.

[256] KNAW et al. (2014). *Standard Evaluation Protocol 2015 – 2021. Protocol for Research Assessments in the Netherlands.*

D.5.4 Changes/trends in accreditation quality control

Regarding quality control of education, there are some important trends that are noted by NVAO. These include a stronger emphasis on information accessibility of decisions and reports, including meaningful and unequivocal defining of core data; the implementation and further development of new accreditation systems in the Netherlands; promoting institutions and programmes to act on recommendations in assessment reports; increased focus on external communication and a more public stance to realise the desired positioning and stakeholder relations, including the use of social media.[257] Regarding quality control of research, changes have not been very substantial. The evaluation of the previous SEP period showed positive results and users emphasised the importance of continuity in the guidelines for research assessment. It was also stressed that the administrative burden should be diminished and that more emphasis should be placed on societal relevance, on positioning and on benchmarking. In terms of research quality control, changes can be labelled as (1) decreasing administrative burden for evaluators and evaluated bodies; and (2) increasing focus on societal relevance, on positioning and on benchmarking. The emphasis on output has decreased over the years, while the emphasis on relevance and integrity has increased.

D.6 Feedback on the structure and characteristics of the HEI system

The Dutch system is a binary system that consists of 37 state funded colleges and 14 state funded universities. The colleges include general colleges as well as colleges specialising in a specific domain. The Dutch colleges host over 420,000 students and employ over 40,000 staff members. The colleges have increased significantly in size since the mid-1990s. The 14 universities are on average slightly larger in size. They house 240,000 students. Almost half of the universities are general universities; the other ones focus on specific disciplines or types of education. Both the colleges and the universities are publicly funded. The fourteen Dutch universities offer a total of 422 BA programmes, and a total of 964 MA programmes.[258] Both numbers are about three to four times as high as the Finnish numbers. The 37 Dutch colleges offer over 1200 BA programmes, and over 300 MA programmes. [259]

Like most publically funded organisations, the Dutch universities and colleges, as well as the funding bodies, are subjects to fair amounts of feedback from society. The Dutch government is often criticised for underfunding higher education in The Netherlands. The main feedback is that absolute funding has stayed more or less the same in the past years, while the number of students increased significantly (cf. Section D.4). The Ministry's *Wetenschapsagenda* that will be discussed in Sections D.12 and D.13 has received substantial feedback from society. One of the most important critiques was that the Ministry –in its funding policies- focuses too much on the higher TRL levels, the interests of a small group of PLCs, and neglects the fundamental sciences in TRL1, and in TRL2. Another claim is that the Ministry underfunds the humanities.

Individual universities and colleges also receive significant feedback from the broadr public in The Netherlands. Much of this is channeled through two specific pressure groups: *Beter Onderwijs Nu* (BON, Better Education Now), and –more recently- *Science in Transition*. The first focuses primary on education at the Dutch Universities and colleges. It states that these institutes are spending too much of their resources on managers, and on teaching generic skills. Domain knowledge as well as the 'teacher as a craftsman' should receive more attention in Dutch (higher) education. The latter focuses mainly on the way research is performed at universities in The Netherlands,

[257] NVAO (2012). Strategy NVAO 2012-2016.

[258] Source: Vereniging Hogescholen, VSNU & NRTO via *Studiekeuze123.nl.*

[259] Source: Vereniging Hogescholen, VSNU & NRTO via *Studiekeuze123.nl.*

and the way grants are awarded. Its main concern is the emphasis put of output indicators in science in The Netherlands.

Performance of the Dutch HEI system

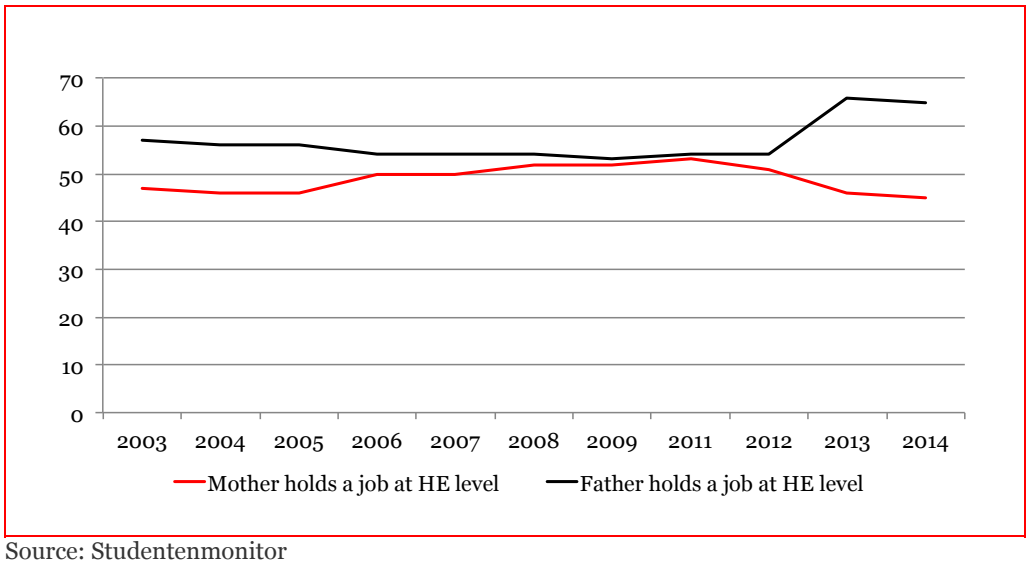
D.7 Education

This section discusses access, graduation performance, mobility of students, and employability outputs of the Dutch HEIs.

The Dutch ambitions in terms of access to higher education have always been significant. Students who obtain certain secondary school qualifications must be accepted into Netherlands' public tertiary education institutions. A six-year university preparatory education (VWO) qualifies for admittance to a university or a college, while a five-year general secondary education (HAVO) qualifies for admittance to only a college, as does a senior four-year, level 4 vocational education (MBO). College students can enter university programmes with their *propaedeuse diploma* from an HBO, and they can enter a university master's programme with their college bachelor degree.[260] The Netherlands has always aspired to have a tertiary education participation rate of 50% of its population by 2010. This goal has been attained. There have however also been serious weaknesses when it comes to access of the system. Completion rates for non-western immigrant populations remain lower than for other populations. Part-time students are not favoured the way the full-time students are, and flexibility from the institutions towards these part-time students is often low. From a certain age (now 30 years) financial support to individual students decreases, while tuition fees increase. This hinders participation of older students. Each student is allowed to obtain one BA and one MA. A Second diploma requires an increase of tuition fees. Family income is a strong determinant of HE participation, which is a clear indication that there is still a world to win when it comes to access. The figure below shows that Dutch universities and colleges have not succeeded in recruiting students from disfavoured socio-economic backgrounds.

[260] OECD (2008). *OECD Reviews of Tertiary Education NETHERLANDS*.

Figure 60 Socio-economic backgrounds of Dutch HE students in terms of mother/ father occupations



Source: Studentenmonitor

Graduation rates have always been an issue in The Netherlands: "The proportion of students who graduate, and the speed of their graduation, could be better".[261] This might be related to the fact that students in Dutch universities and colleges have traditionally demonstrated low motivation for their studies. *Studentenmonitor 2007* shows that 5% of students in the HBO sector and 6% in the WO sector are unmotivated. Since then, graduation rates have not really improved, as the figure below shows, even though individual universities and colleges (who are primarily responsible) receive substantive incentives to boost rates.

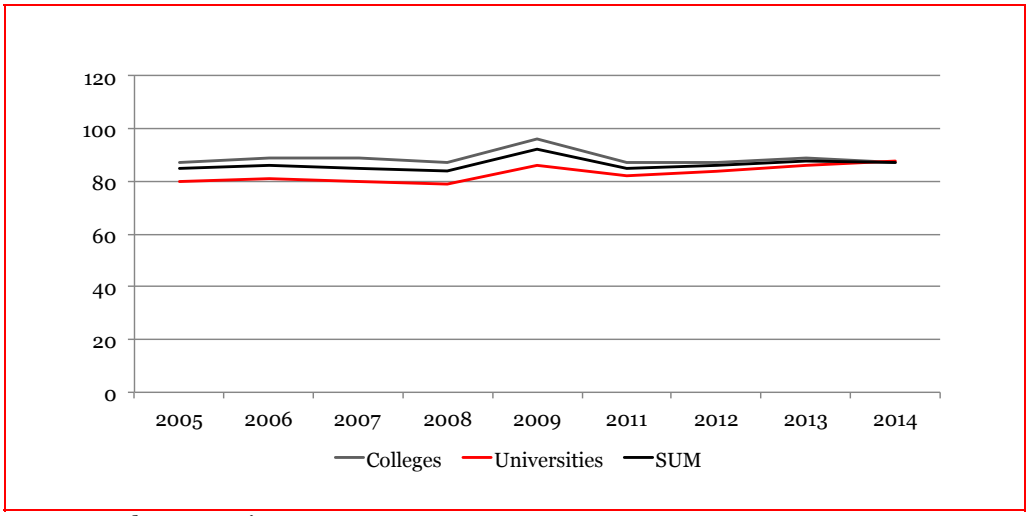
Employability of the Dutch higher education is generally good. Unemployment rate among highly educated 20-34 years olds is among the lowest in Europe (ca 2%), and the rate with which Dutch graduates take high positions[262] is relatively high in comparison to many other countries, which is an indication that the skill level of Dutch graduates is quite high.[263] The percentage of students that want to work in academia is increasing (23% in 2014), which also goes for the percentage of students that want to work for government (26% in 2014); these figures however also indicate that employability in the private sector is less desired by many students.

[261] OECD (2008). *OECD Reviews of Tertiary Education NETHERLANDS.*

[262] ISCO 1/2 and ISCO 3 level.

[263] CHEPS (2010). *Quality of Higher Education in The Netherlands.*

Figure 61 Progress of studies (as a proxy for graduation rates)



Source: Studentenmonitor

D.8 Research

Research output (# articles, citations). The number of articles published by research in Dutch universities has risen from 54,085 in 2000 to 68,539 in 2013.[264] That is an increase of 26%. The research in Dutch universities score above average in terms of citations. The small Tilburg University scores 10% above average in terms of citations. The large Utrecht University scores 57% above average in terms of citations. The other universities are in between.

Relative share in EU and ERC funding. The Evaluation of Dutch participation in the Framework Programmes stated that "Despite its small size, the country takes a leading European position in the return on financial investment ('*juste retour*') and the absolute number of participations and coordinators. In addition, researchers from Dutch public and private sector organisations have acquired a recognised position in thematic areas such as Life Sciences and Health, Food Quality and Safety, ICT and Sustainable Energy."[265] Between 2007 and 2014 a total of 8,069 non-unique organisations participated in the FPs. EU contributions to Dutch research organisations exceeded €3.29 bln.

In terms of university rankings, The Netherlands is one of the few countries of which essentially all its universities can be seen in major rankings; except for three of them, they all are included among the top 100 in at least one of the major rankings (and two more universities are on place 101 or 102 in at least one of the rankings). Most of these rankings stress the weight of research. But the prominent position also goes for rankings that allocate substantial weight to education (e.g. QS Ranking), or that are based on reputation of the institute (e.g. THE World Reputation Ranking).

[264] Source: VSNU/ KUOZ.

[265] Erawatch Country Fiche, The Netherlands.

Figure 62 Rankings of Dutch universities

University	ARWU 2014	THES 2014	QS 2014	Leiden 2014
Utrecht University	*57*	*79*	*80*	*77*
Leiden University	*77*	*64*	*75*	*53*
Groningen University	*82*	*117*	*90*	*120*
VU Amsterdam	*100*	*136*	*171*	*64*
Radboud University	*101-150*	*140*	*147*	*97*
University of Amsterdam	*101-150*	*77*	*50*	*81*
WUR	*101-150*	*73*	*151*	*93*
Erasmus University	*151-200*	*72*	*90*	*85*
Delft University of Technology	*201-300*	*71*	*86*	*148*
Maastricht University	*201-300*	*101*	*118*	*110*
Eindhoven University of Technology	*301-400*	*144*	*156*	*94*
University of Twente	*301-400*	*200-225*	*212*	*102*
Tilburg University	*401-500*	*276-300*	*367*	*252*
Open University	*n/a*	*n/a*	*n/a*	*n/a*

Source: VSNU

In general the Dutch universities operate well when it comes to research. This is partly due to the absence of a strong RTO infrastructure on the lower TRL levels. Basic research is in most fields the exclusive domain of universities.

D.9 Third mission

In The Netherlands commercialisation of scientific research has been a priority for policy makers and knowledge institutes for several years. Government policy started from several reports by the Innovation Platform (2004–2006) about the knowledge paradox (universities and knowledge institutes perform to world class standards but this knowledge does not find its way to new products, services, etc.). The main barriers for commercialisation in the Netherlands were found to be:[266]

- Insufficient investments
- Inadequate institutional frameworks (e.g. lack of incentives, organisational structures, and support)
- Weak links between science and industry

In response, the Government and the research councils initiated several schemes to stimulate the commercialisation of the results of scientific research, the most important one being the *SKE* as part of the *TechnoPartner Programme*. Other governmental initiatives included investment in the *Casimir* programme (to support mobility of researchers between science and industry), Innovation Labs, the Valorisation Grant, and a programme for entrepreneurship in (higher) education.

Commercialisation has remained one of the priorities of the Government. In the latest strategic agenda for Higher Education and Science the Government stated that

[266] Wijffels, H. and Grosveld, T. (2004). '*Vitalisering van de Nederlandse kenniseconomie, Het beter ontwikkelen en benutten van de mogelijkheden van mensen als de sleutel voor een dynamische kenniseconomie*', Advies Werkgroep dynamisering kennis- en innovatiesysteem, Innovatieplatform, 4 November 2004.

commercialisation should be an even more integral part of knowledge institutes, and that science has to contribute to the so-called top sectors (priority sectors within industry). In addition, the Government has invested in the continuation of most of the support schemes mentioned above.

The SKE was a part of the Action Programme TechnoPartner that was launched in 2004 with a duration of five years. The action programme consisted of a coherent package of measures to improve the climate for starting entrepreneurs in The Netherlands. The action programme aimed at dealing with a number of bottlenecks, such as the lack of financing for high-tech start-ups, the lack of entrepreneurship within knowledge institutes, the lack of entrepreneurial spirit (entrepreneurial culture) and the small amount of patents at Dutch universities. Apart from SKE, there were also programmes aimed at Venture Capital (the Seed Capital scheme and the TechnoPartner Label) and Business Angels (the Business Angels Programme, BAP).

The SKE was created to stimulate commercial knowledge exploitation and business development of the results of publicly financed research. The programme aimed to do so by accomplishing structural attention at knowledge institutes, in order to create more and better high-tech start-ups and build up a relevant patent portfolio that can thereafter be transferred to the business community. The SKE was focused on the first parts of the knowledge exploitation chain, intervening in the entire process up to and including company creation.

The subsidy was granted to consortia including at least one knowledge institute and one company. The applications needed to contain a structured approach to knowledge exploitation and the creation of sustainable facilities for high-tech start-ups. The maximum grant consisted of 50% of the project costs with a maximum of €2.5 million per project.

The SKE consortia could file applications for four different modules:

- Screening and Scouting: screening is defined in the programme as screening research for commercial potential, and scouting is defined as looking for researchers or entrepreneurs who want to commercialise this research.
- Patent costs: support of public knowledge institutes in the financing of patent applications. In the explanation for the programme, it is explicitly stated that the subsidy was only granted to affect a growth of the number of granted patents.
- High-tech start-up support: support of high-tech start-ups, for example by providing guidance and coaching, accommodation, education and training, networking activities, or access to equipment.
- Pre-seed funding: creation of a fund that provides pre-seed capital to high-tech start-ups. The loans were granted as a personal loan to the person(s) who want(s) to start the company.

The third mission remained especially important to Dutch universities and – to a lesser extent – Dutch colleges. Universities aim to commercialise knowledge in all fields of science, including the social sciences and humanities. In addition to the SKE described above, clear indications of the increased attention to the third mission include:

- All Dutch universities, and many colleges, have set up Technology Transfer Offices (TTOs), and Entrepreneurship Centres.
- Commercialisation has become an integral part of research quality measurements.[267]

[267] NWO, ERiCplus, 2012.

- HR policies pay increasing attention to commercialisation skills. Knowledge transfer skills have been added to the job classification system of universities and in the job profiles for academic staff commercialisation skills is often explicitly mentioned.
- Cooperation with industry has – according to the VSNU – increased, partly due to the establishment of science parks.

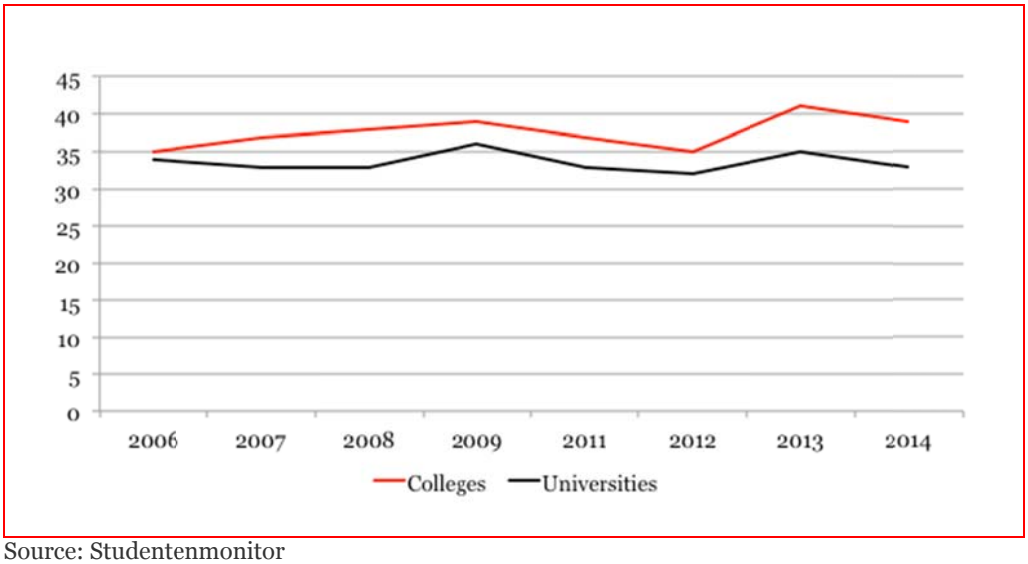
Universities however also explicitly mention the problem that they find it hard to quantify the results of their third mission effort. The main reason is that the policy field is both rather new to them and rather heterogeneous. The Figure below however is a clear indication of the results of their investments in campuses. Of the seven national campuses, six are located on or near universities.

Figure 63 Campuses in The Netherlands

Source: Buck Consultants

In addition to the instruments identified above, universities have spent considerable resources in entrepreneurship education. Some universities offer complete BA or MA programmes on entrepreneurship, while others offer entrepreneurship education in minors. The Figure below presents the percentage of students that seek a career as an entrepreneur. Percentages for both college students and university students seem to be relatively constant, despite substantial investments.

Figure 64 Percentage of students that seeks a career as an entrepreneur

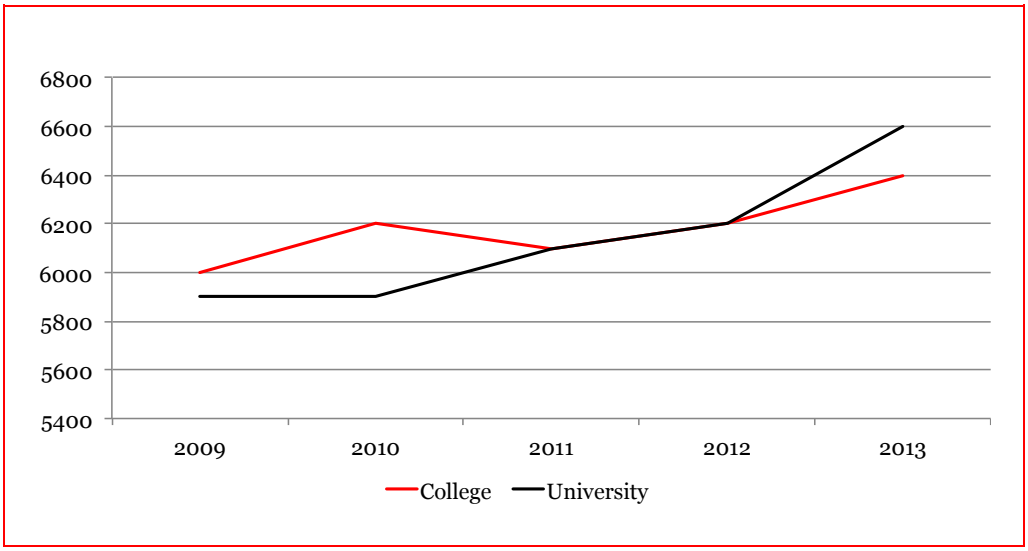


Source: Studentenmonitor

D.10 Cost effectiveness

No data on effectiveness of research are available. Figures on investments in HEIs as % GERD, and public expenditure as % GERD are presented in Section D.4 . The figure below presents expenditures per student on both college level and university level. Rate on return studies figures are not available.

Figure 65 Cost effectiveness: expenditures per student on both college level and university level



Source: Ministry of Education, Culture, and Science

Expenditures per student in universities have risen with 11.86%. Expenditures per student in the colleges have risen with 6.68%. Cumulative inflation in this period was 8.9%.

D.11 Conclusions

One should conclude that the performance of the Dutch HE system is in line with what is expected from it in The Netherlands. The most important conclusion is that the role of the system in The Netherlands is significant. The Netherlands has always aspired to have a tertiary education participation rate of 50% of its population by 2010. This goal has been attained. Employability of the Dutch higher education is generally good. Unemployment rate among highly educated 20-34 years olds is among the lowest in Europe (ca. 2%), and the rate with which Dutch graduates take high positions[268] is relatively high in comparison to many other countries, which is an indication that the skill level of Dutch graduates is quite high.[269]

But there have however also been serious weaknesses when it comes to access of the system. Completion rates for non-western immigrant populations remain lower than for other populations; part-time students are not favoured the way the full-time students are, and flexibility from the institutions towards these part-time students is often low. All actors are aware of the improvements needed in that regards, yet the challenges remain and little improvement is witnessed. Another issue is the low graduation rates (and little improvement over there).

Research outputs are also considered good. The number of articles published by research in Dutch universities has risen from 54,085 in 2000 to 68,539 in 2013.[270] That is an increase of 26%. The research in Dutch universities score above average in terms of citations. The Evaluation of Dutch participation in the Framework Programmes stated that "Despite its small size, the country takes a leading European position in the return on financial investment ('juste retour') and the absolute number of participations and coordinators. In terms of university rankings, The Netherlands is one of the few countries of which essentially all its universities can be seen in major rankings; except for three of them, they all are included among the top 100 in at least one of the major rankings.

The third mission has received considerable attention in The Netherlands. All Dutch universities, and many colleges, have set up Technology Transfer Offices (TTOs), and Entrepreneurship Centres, and commercialisation has become an integral part of research quality measurements.[271] In addition to that HR policies pay increasing attention to commercialisation skills. Yet, the third mission has remained one of the priorities of the Government. In the latest strategic agenda for Higher Education and Science the Government stated that commercialisation should be an even more integral part of knowledge institutes, and that science has to contribute to the so-called top sectors (priority sectors within industry).

HEI policies and trends

D.12 National policies

Both the colleges and the universities in The Netherlands are highly autonomous. As a consequence the Ministry of Education, Culture, and Science is modest when it comes to developing and implementing national policies. The equilibrium is appreciated by all, and there is little room for punctuations.

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[268] ISCO 1/2 and ISCO 3 level.

[269] CHEPS (2010). *Quality of Higher Education in The Netherlands*.

[270] Source: VSNU/ KUOZ.

[271] NWO, ERiCplus, 2012.

Nevertheless, the Ministry of Education, Culture, and Science states that quality of higher education should increase. This was one of the main reasons for the Ministry to install in 2009 the so-called *Commissie Veerman*, and advisory group headed by a former minister. Recommendations were made to raise quality and especially differentiation in Dutch higher education. This should be done via output performance contracts that were described above.

In addition to that, the Dutch Government has implemented the new Law on Higher Education that was approved in 2013.[272] In this context, the Government has taken a number of measures that allow for more flexibility in the system, and for a better alignment with EU research and innovation policy, and they cover the major reforms and recent developments/trends. The following aspects of that law are relevant and will have an impact on Dutch higher education.

- Increasing recognisability of programmes. The Law states that both colleges and universities should use more recognisable names for their programmes. It should be ensured that similar programmes have the same kind of name. This should allow for some rationalisation of the large number of programmes that were identified in section D.2.2 . This is also a response to wide societal complaints about the large numbers of so-called 'fashion studies'.
- Shorter College Programmes for VWO graduates. To increase the attractiveness of colleges for students with a VWO degree (and thus decreasing the pressure put on universities), colleges will be setting up three year programmes. This allows VWO graduates to enter the labour market slightly earlier.
- Broader undergraduate programmes. Universities and colleges can increasingly experiment with merging existing programmes. One of the supposed goals of universities and colleges might be to create broader bachelors tracks, that might eventually emerge into liberal arts colleges. Within these broad undergraduate programmes, students will be allowed to choose their own routes or accents.
- An Associate Degree will be implemented. The Associate Degree is set up as a shorter college programme with a strong and direct focus on the labour market. It was implemented last year, and the first AD students have entered the colleges. If it all works out will, it will become easier for MBO students (cf. section D.7) to enter higher vocational education. Associate Degree programmes will be very applied, and aim to follow from MBO level education as if it were the only logic consequence. In addition to MBO students, the AD programmes also aim at attracting people with several years of working experience. It is widely recognised that LLL is not successful in The Netherlands, and the Associate Degree is aimed to give a new impetus to this.
- Statutory tuition fees at bridging BA-MA programs. Bridging programmes (premasters) aim to make the flow of bachelor's degree at university master's easier.
- College title to be formalised. Graduates of Dutch colleges will be allowed to hold the title of Bachelor or Master. To these titles they may add the suffix 'of Laws', 'of Business Administration' or 'of Nursing'. Since January 1, 2014 bachelors may also carry the suffix 'Arts' and' or 'Science'. The aim of this policy is to make titles awarded by colleges better recognisable on the (international) labour market.
- Differentiation in tuition fees. Certain programmes that have been labelled by NVAO (cf. section D.2.4 ; D.5.1 ; D.5.2) as excellent, will be allowed to

[272] Wet van 10 juli 2013 tot wijziging van de Wet op het hoger onderwijs en wetenschappelijk onderzoek en enkele andere wetten in verband met de uitvoering van diverse maatregelen, aangekondigd in de Strategische Agenda Hoger onderwijs, Onderzoek en Wetenschap (*Wet Kwaliteit in verscheidenheid hoger onderwijs*).

implement higher tuition fees (up to 5 times the statutory tuition). In other cases, the Ministry for Education, Culture, and Sciences will have to give permission for such an increase.

- Internationalisation is not an issue at the system level, yet it is at the institutional level. Policies for (large) research infrastructures were covered by e.g. advisory councils and by the recent Vision on Science 2025 (*Wetenschapsvisie 2025*) of the Dutch Ministry.

D.13 Institutional policies

Both the VSNU and the Vereniging Hogescholen were discussed in section D.2.3 . VSNU represents the universities to the Government, Parliament, and governmental and civic organisations, and facilitates debate, and it develops and disseminates common positions held by its member universities. The Vereniging Hogescholen focuses on strengthening the position of colleges. Together with their member organisations, both have set up substantial strategy projects that aim to guide their member organisations towards 2025.

In both strategy process the cooperating institutes have not yet come up with a clear vision on HEI policies and trends on education, research, third mission, and internationalisation. When it comes to the descriptive level there are however some clear findings.

In terms of education, the HEIs are dealing with new types of learning, e.g. blended learning, and MOOCs. Both are however not yet beyond the stage of policy making, apart from individual initiatives. At the same time the HEIs are aware that they are in a dynamic environment. The number of students has grown substantially, which also goes for the heterogeneity of the student population. At the same time budgets (the sum of funding streams) have not gone through the same growth, which puts colleges and universities in a challenging position. They are investing in stronger and more unique profiles, as they believe that this might increase their competitive advantage, and it will improve their base funding position (cf. section D.4). When it comes to universities this process of 'profiling' cannot be seen without looking at the process of clustering among universities. Universities that are complementary increasingly cooperate, and set up combined programmes.

In terms of research, the universities stress the importance of their independent position. They also stress the importance of the close ties between education and research. Dutch universities are indeed in a good position in this respect. These strong ties (especially at the graduate level) strengthen the quality of the teaching staff, and increases the changes of talent to come into contact with actual research. The close ties between education and research are considered very important by universities. Within this context, universities have invested substantially in increasing the focus of their research. They have become more dependent on foreign competitive funding (second funding stream, especially FP7/ H2020), and have witnessed a strong increase in outputs in terms of PhD students. The universities have always depended heavily on the so called ICES-KIS from the Dutch government. The funds have been abolished by the Dutch government, which has had its impacts on research funding available for Dutch universities. Most of them have identified 'regional embeddedness' as a way to compensate the ICES-KIS funds. It has always been considered important by universities, but the fact remains that this is difficult to combined with research excellence.

The colleges are more successful in this respect. Their resources spent on research are (very) limited, especially compared to those spent in universities. Nevertheless, there has been a strong increase of R&D in colleges, especially in the higher TRL levels, in strong correlation with education, and in close regional embeddedness. The *Wetenschapsagenda* that was identified in the previous section will have its impacts on the research policies of universities, but it is too early to elaborate on their details. In terms of the third mission and in terms of internationalisation, most universities and colleges have their own policy programmes and strategies.

Talent policies and internationalisation policies are of concern to NWO. It has set up a talent scheme that is referred to as the Innovational Research Incentives Scheme (*Vernieuwingsimpuls*). The scheme offers personal grants to talented, creative researchers. The funding enables applicants to do their own line of research. This is expected to boost innovative research and promotes mobility within scientific research institutes. The Innovational Research Incentives Scheme comprises three grants geared to different stages in a researcher's scientific career:

- Veni, for researchers who have recently obtained their PhD
- Vidi, for researchers who have gained several years of research experience after their PhD
- Vici, for senior researchers who have demonstrated an ability to develop their own line of research

Evaluations of the scheme have been positive. The scheme has resulted in a substantial amount of ERC grants.

Talent policies and internationalisation policies are also of concern for the institutes. In 2008 it was concluded that The Netherlands is one of the few OECD countries that does not benefit from international brain drain.[273] Dutch universities and colleges are aware that they are not yet attractive enough to international talent and that this should be improved. The HEIs are fully aware of the impacts of the Bologna processes in the last decade. Dutch universities and colleges have set up cooperation agreements with foreign counterparts and several universities and colleges have set up branches abroad, which does not always go without public debate.

Conclusions

Like the Finnish system, the system in The Netherlands is generally assumed to be performing well. The level of higher education is high, which also goes for the quality and quantity of research in universities. There are in The Netherlands substantial worries however about relative funding decreases in the last couple of years that received little attention due to the fact that they were mainly caused by a very significant increase in student numbers combined with a small budget increase. At this point in time, like in Finland, parts of the system seems underfunded. In The Netherlands the complaints focus on the universities and colleges in general, and in particular on funding in social science and humanities. Like in Finland substantial concern are expressed regarding the future economic prospects for funding of Higher Education in The Netherlands. Related to this concern is the concern about future sustainability of the HEI system in The Netherlands and the ability of the system to change as the environment changes. Most universities and colleges in The Netherlands are not very active in debate on modernisation of teaching and learning methods, including digitalisation and OER. Some, like Utrecht University invest in educational innovation, but many do so only to a small extent.

It is generally thought that the number of universities is too large for a system such as the Dutch one. Universities, like the three technical universities, or the three universities in the province of South Holland, might decide to merge. Similar discussions can be heard at the College level. The decades of reorganisations are not over yet, and more Colleges will be forced to combine forces. The Netherlands will also witness some extent of fading away of the border between colleges and universities.

[273] Nederlands Observatorium van Wetenschap en Technologie, 2008.

There have been a number of attempts to join forces (initiated by the institutes themselves); one of them is considered a success to some extent. These mergers were forced by various factors, including ideological ones (universities and colleges affiliated to similar churches combining forces) strategic ones (the need to cover large parts of the country in a College/University consortium), and efficiency. However, one of the main rationale for such consortiums (minimising difficulties to transfer between colleges and universities for students; solving inflexibility and rigidity) have not been structurally solved. One expects that the incremental changes that we have seen in the past decades will continue, with incidental punctuations for instance regarding changing student loan facilities, or a new Science Agenda. Reforms such as in Finland are not expected.

Appendix E Benchmark case study: Switzerland

Barbara Good

Structure and characteristics of the Swiss HEI system

E.1 Main characteristics of the HEI system

The Swiss HEI system is characterised by two main elements:

- Dual system: Since the mid-1990s, the Swiss HEI system has been dual. The university sector is composed of cantonal universities and federal institutes of technology, while the non-university sector is composed of universities of applied sciences (UAS). The two sectors are ruled by different laws and public regulations and have largely separated funding streams. The seven public UAS were created in 1997 (based on the 1995 Universities of Applied Sciences Act) as a reform and merger of existing professional tertiary education institutions. The process stared in a few fields (technology, economics and business administration, construction) but the universities of applied sciences extended to most professional domains (arts, social work, health, teacher training) after 2000.[274]
- Federalism: In Switzerland, political responsibilities for research and higher education are divided between the federal state (confederation) and the regional authorities (the cantons). The confederation is responsible for competitive funding of research through the research council (Swiss National Science Foundation SNSF) and the innovation agency (Commission for Technology and Innovation CTI) and for the coordination of research activities, while the responsibility for higher education is mixed and shared between confederation and cantons as follows: The confederation is responsible for the two federal institutes of technology in Zurich (ETHZ) and in Lausanne (EPFL) and their affiliated research institutes – these organisations make up the so-called ETH domain. The cantons are responsible for their universities (there are ten of them), while a national act regulates federal support to these institutions. The cantons are also responsible for the UAS, but under the framework of a national law.[275]

E.2 Main actors in the HEI system

E.2.1 Responsible Ministries

At federal level, responsibilities for research, higher education and innovation lie with the Federal Department of Economic Affairs, Education and Research (EAER).[276] The EAER has only had sole responsibility for research, higher education and innovation since the beginning of 2013.[277] Inside the Federal Department of Economic Affairs,

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[274] Benedetto Lepori, Jeroen Huisman, Marco Seeber, Convergence and differentiation processes in Swiss higher education: an empirical analysis, in: Studies in Higher Education, 2012, 1-22.

[275] http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/ch/country?section=Overview&subsection=BasicChar

[276] The Federal Departments are ‚super-ministries' that encompass a number of so-called Offices and State Secretaries. Offices and State Secretaries are more like ministries in other countries.

[277] This reorganisation was decided by the Federal Council (executive) at the end of June 2011. In practice, this means that the State Secretariat for Education and Research (formerly part of the Federal Department of Home Affairs) was merged with the Federal Office for Professional Education and Technology (part of

Education and Research, the most important unit is the State Secretariat for Education, Research and Innovation (SERI). It coordinates the whole policy field, including the preparation of the Federal Bill on Research, Education and Innovation (the so-called ERI Message), support to cantonal universities, funding of basic research through the SNSF and international science activities of Switzerland. It is also responsible for professional education, the coordination of the UAS and innovation funding through the CTI.

At the cantonal level, the cantonal ministers for education are responsible for 'their' universities and UAS. They coordinate their activities in the Conference of the Cantonal Ministers of Education.[278]

E.2.2 Universities, universities of applied sciences and public research institutes

There are three types of HEIs in Switzerland[279]:

- The two federal institutes of technology (Federal Institute of Technology Zurich (ETH Zurich) and Federal Institute of Technology Lausanne (EPF Lausanne). The ETHZ and EPFL are specialised in natural sciences and technology
- The ten cantonal universities: of the ten cantonal universities, seven are 'universal' universities, covering a broad spectrum of disciplines (including medicine280), whereas three are specialised: St. Gallen (economic and social sciences); Lucerne (law, theology, cultural studies and social sciences), established in 2000; and Lugano (architecture, communication sciences, economics and business studies, ICT), established in 1996
- The seven public and two private UAS; in practice, their focus is on teaching although they also have a mission to conduct applied R&D and engage in knowledge transfer. The terminology used to refer to UAS compared to universities normally is "equal but different".281 UAS normally span several cantons.282

Following the Bologna reform, both universities and UAS offer three year bachelor degrees, while universities also offer master programmes. While the Bachelor degree is the regular degree in UAS, accepted by the labour market, in 2007 they acquired the right to offer professionally oriented master degrees; however, only in selected areas and with limited funding. There are different access requirements for the two sectors, going back to different tracks (academic and vocational) in secondary education. Permeability between the two sectors is low but UAS bachelor graduates can enrol for a university master degree.[283]

Advanced research training is a specific task of the universities, and the UAS do not have the right to award PhDs. For the UAS, (applied) research is an additional task, and it is envisaged that in the longer term they would spend 20% of their resources on research. UAS often cooperate with SMEs in the region, often in the framework of cooperative projects funded by the innovation agency CTI.

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the Federal Department of Economic Affairs), resulting in a new State Secretariat for Education, Research and Innovation.

278 http://www.edudoc.ch/static/web/edk/port_edk_e.pdf

279 Teacher training institutions are also formally part of the HE system. Some are partly integrated in the UAS system, others are stand-alone institutions.

280 Health policy lies in the authority of the cantons. Therefore, the training of health professionals, including doctors, as well.

281 Of course, differentiation is the first step to hierachisation.

282 e.g. the University of Applied Sciences of North-Western Switzerland is located in the four cantons Basel-Stadt, Basel-Land, Aargau and Solothurn).

283 Swiss Coordination Centre for Research in Education, Swiss Education Report 2014, Aarau 2014.

The distinction made between the university sector and the UAS sector has been remarkably stable over time, creating distinct profiles of universities and UAS. Lepori et al. argue that this is due not only to different regulations for the two sectors but also to the

> *"strength of the normative distinction by a broader set of audiences [...] creating competitive pressures to keep the two populations apart – either through distinct funding rules or through the behaviour of some audiences like the academically orientated Swiss National Science Foundation".*[284]

Switzerland has very few public research organisations. There are four dedicated research organisations (Paul Scherrer Institute, Federal Institute of Aquatic Science and Technology EAWAG, Swiss Federal Laboratories for Materials Testing and Research (EMPA), and Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), but they belong to the ETH domain. There are also a few public service research organisations, in agricultural research and the Swiss Federal Institute for Vocational Education and Training (SFIVET). They are part of the Federal Department of Economic Affairs, Education and Research.

Research is conducted almost exclusively in the universities and, to a smaller extent, the UAS. Research conducted in and by independent (non-university) research institutes and by public service labs is marginal. This can be seen in the very low figure for GERD performed by government sector – 60.393 millions of PPS[285] in 2008[286] (see also Figure 67). This value is comparable with the value of Iceland and Luxembourg, both much smaller countries.

E.2.3 Intermediary organisations

At the intermediary level, the main actors are the two project funding agencies and an advisory body:

- The Swiss National Science Foundation (SNF) is a private foundation funded by the confederation responsible for the support to basic research. Its target audience are the universities (federal and cantonal) although it is open to all types of HEIs.
- The Swiss Innovation Agency (CTI) is the federal support agency for innovation, which supports joint projects between universities (often universities of applied sciences) and private companies as well as innovation activities.
- The Swiss Science and Innovation Council (SSIC) is the advisory body of the national government for science and technology policy.

E.2.4 Main bodies for quality assessment / quality management and accreditation

The Swiss Center of Accreditation and Quality Assurance in Higher Education (OAQ) assures and promotes the quality of teaching and research at universities in Switzerland. It is independent, uses internationally recognised methods and is able to draw upon the knowledge and experience of leading experts.[287]

The Swiss HEI sector is currently undergoing a major reform. The new Federal Act on Funding and Coordination in the Higher Education Sector (HFKG)[288] has come into force by decision of the Federal Council (cabinet) in the beginning of 2015. This will give the accreditation of higher educational institutions in Switzerland a new basis.

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[284] Benedetto Lepori, Jeroen Huisman, Marco Seeber, Convergence and differentiation processes in Swiss higher education: an empirical analysis, in: Studies in Higher Education, 2012, p. 19.

[285] PPS = purchasing power parity.

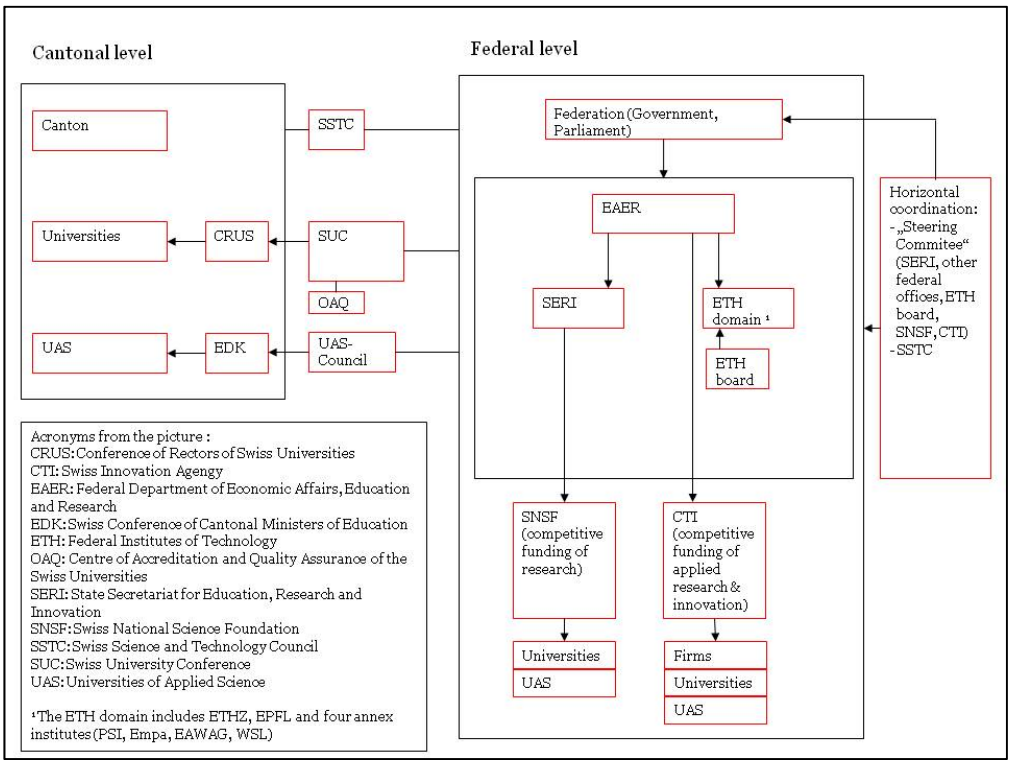
[286] Eurostat, latest available figure.

[287] w.oaq.ch/pub/en/01_00_00_home.php

[288] http://www.sbfi.admin.ch/themen/hochschulen/01640/index.html?lang=en

The most important change concerns institutional accreditation, which will become a requirement for eligibility to use the designation "University", "University of Applied Sciences" or "University of Teacher Education" or any derived name (article 29 HFKG).

Figure 66 Structure of the Swiss HEI governance system



Source: Technopolis, based on Erawatch.

E.3 Acts and regulations

E.3.1 Reform of institutions governing and coordinating Swiss higher education

The distribution of competencies between the federal state and the cantons in the Swiss research and higher education system – who is responsible for what? – has grown historically. This has led to highly complex political decision making structures, legislation and financial mechanisms. Currently, the Swiss higher education system is being reformed, with the aim to create a more coherent and efficient national research and education area. The starting point of the reform was a new constitutional article accepted in a referendum in May 2006 stating that, among others, the confederation and the cantons shall be jointly responsible for the coordination and quality assurance of Swiss higher education. Pertinent legislation has been enacted at both cantonal and federal levels.

The Federal Parliament passed the Federal Act on Funding and Coordination of the Higher Education Sector (HFKG)[289] on 30th of September 2011, planned to come into effect at the beginning of 2015.[290] The new law will completely overhaul institutions

[289] http://www.sbfi.admin.ch/themen/hochschulen/01640/index.html?lang=en (in English)

[290] http://www.swissuniversities.ch/en/home/

governing and coordinating Swiss higher education. It will also define access requirements to higher education institutions and lay the foundations for an accreditation council responsible for quality assurance in higher education.

E.3.2 Main aspects of the new HFKG

- The confederation and the cantons continue to be responsible for operating and funding their HEIs (universities and UAS). The confederation continues to support universities and UAS, but not the universities of teacher education. The Act will not affect the owners' competences or responsibilities for HEIs.
- The HFKG will specify the necessary principles of coordination and funding, and replace the Federal Act on Financial Aid to Universities and on Cooperation in the Field of University Education (UFG)291 and the Federal Act on Universities of Applied Sciences (FHSG)292. However, the Federal Act on the Federal Institutes of Technology293 remains in force. In addition to the HFKG, there is a need for a new inter-cantonal agreement on cooperation in higher education between the cantons and a new cooperation agreement between the confederation and the cantons.
- The HFKG will regulate the framework conditions for joint coordination of the entire higher education sector (universities, UAS, universities of teacher education and other tertiary-level institutions) by the confederation and the cantons.
- It will define the prerequisites for the allocation of federal funding to cantonal universities and UAS.

E.3.3 Other important Acts

At federal level, another important act is the new Federal Act on the Promotion of Research and Education (FIFG).[294] Article 64 of the Federal Constitution stipulates the confederation's obligation to promote and fund research and innovation. The FIFG defines the confederation's tasks and competences in these areas. It lays down the tasks of the SNSF, the Swiss Academy of Sciences and the CTI, regulates government (sectoral) research and the co-funding of research organisations, and governs international cooperation in the area of science.

Cantonal laws govern the cantonal universities (e.g. the Act on the University of Zurich[295]).

E.4 Funding of HEI

E.4.1 Basic indicators for R&D

As can be seen from Figure 67, expenditure on R&D is high in Switzerland, both in terms of R&D expenditure (GERD) as % of GDP and GERD per capita. GERD in % of GDP was 2.87 in 2008,[296] of which 68% was financed by industry, 23% by government, 6% by abroad and 3% by other national sources. As can be seen from these figures, private R&D expenditure, particularly in the pharmaceutical and biotechnological sectors, plays a prominent role in the Swiss research system.

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[291] http://www.admin.ch/opc/de/classified-compilation/19995354/index.html (in German)

[292] http://www.admin.ch/opc/de/classified-compilation/19950279/201301010000/414.71.pdf (in German)

[293] http://www.admin.ch/opc/de/classified-compilation/19910256/index.html (in German)

[294] http://www.admin.ch/opc/de/classified-compilation/20091419/index.html (in German)

[295] http://www2.zhlex.zh.ch/appl/zhlex_r.nsf/WebView/142D74D69CC1DA9AC125723C00463FD3/$File/415.11_15.3.98_55.pdf (in German)

[296] No newer figures available.

Higher education intramural expenditure on R&D (HERD) was 0.88 in % of GDP in 2012, up from 0.69% of GDP in 2008, and 0.77% of GDP in 2010, reflecting prioritisation of education, research and innovation policy budgets in recent years.

R&D funded by the government (in % of GDP) is only slightly above the EU27 average, meaning that the relative effort of the public sector is not particularly high, while the absolute amount is very high given the high GDP. The share of R&D performed by HEIs is in line with the EU27 average while the share of R&D performed by the government is substantially smaller (see E.2.2).

Figure 67 Key figures describing the Swiss R&D system

	2009	2010	2011	2012	EU27
GDP growth rate	-1.9	+3.0	+1.9	+1.0	-0.4
GERD as % of GDP	2.87 (2008)	n/a	n/a	n/a	2.06
GERD (euro per capita)	1,352 (2008)	n/a	n/a	n/a	529
GBAORD Total R&D appropriations (€ million)	3,078 (2008)	3,361	n/a	n/a	90,333
R&D funded by Government (% of GDP)	n/a	0.81	n/a	n/a	0.7 (e)
R&D funded by Business Enterprise Sector (% of GDP)	2.11 (2008)	n/a	n/a	2.16	1.30
R&D performed by HEIs (% of GERD)	24% (2008)	n/a	n/a	n/a	23.7%
R&D performed by Government (% of GERD)	1% (2008)	n/a	n/a	n/a	12.6%
R&D performed by Business Enterprise Sector (% of GERD)	74% (2008)	n/a	n/a	n/a	63.1%

Source: Erawatch

There is a clear division of labour among public and private actors in Switzerland, with the public sector primarily funding basic research and education (and some applied research in the HE sector), and the private sector applied research and experimental development. The reason for the public sector to prioritise the funding of basic research is that market failure is largest in education and basic research, while there is strong belief that applied research and experimental development are best left to the private sector, which has a much better knowledge of the market than the state. This is not the particular opinion of the one or the other political party, but the consensus among the parties in the permanent coalition that has governed Switzerland since 1959.

E.4.2 Structure and governance of the HEI funding system

HEIs is Switzerland are mostly publicly funded.

Institutional funding

The dual structure and the division of competences between the confederation and the cantons have led to a fragmented structure of the funding system. *Institutional funding* is typically in form of a block grant.

- Cantonal universities are funded by their canton, other cantons and co-financed by the confederation. 80% of funding comes from the cantons, 20% from the confederation. In 2012 the cantons spent CHF 2874 million (€2300 million297), the confederation CHF 701 million (€560 million). In total, funding from the cantons and the confederation together amounted to CHF 3574 million (€2860 million).298
- Co-funding from the other cantons is based on the number of students from these cantons who study at the university. These sums are calculated based on the number of students and the discipline they study. Co-funding by the confederation is also based on a formula, which contains the indictors number of students (for the teaching component) and external funding (SNSF, European Framework Programme, CTI, contract research) (for the research component).299
- In contrast, the two federal institutes of technology (ETHZ and EPFL) receive their block grant solely from the confederation. The federal government has concluded a performance agreement with the ETH domain; the performance agreement is part of the ERI message and has to be passed by the federal parliament.300 In 2012, funding from the confederation to the ETH domain was CHF 2174.5 million (€1810 million).301
- Overall, institutional grant allocation is weakly competitive but the share of competitive sources is higher for universities in cantons with lower financial capacity.302
- Institutional funding allocation to universities of applied sciences (block grant) is mostly related to the number of students (based on fixed rates agreed nationally) but additional funds are provided by the cantons for research and other activities.

Competitive funding

Competitive funding comes mostly from the Swiss National Science Foundation (SNSF), from the European Framework Programmes and from the Swiss Innovation Agency (CTI). While in 2013 the SNF funded researchers and research projects to the amount of CHF 818.8 million (€680 million)[303], the CTI spent CHF 124.9 (€104 million)[304]. As can be seen from these figures, the focus of Swiss research funding is clearly on basic research.

While universities (cantonal and federal) get most of their competitive funding from the Swiss National Science Foundation and the European Framework Programmes, the UAS win a large share of projects funded by the innovation agency CTI (Figure 68). This is in line with HEIs' missions.

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297 Conversions from CHF into EUR were calculated while the CHF was still pegged to the Euro (cap 1 EUR = 1.2 CHF). Since giving up the cap, exchange rates have changed substantially.

298 Eidgenössisches Volkswirtschaftsdepartement, Beiträge des Bundes und der Kantone an den Bereich „Bildung, Forschung und Innovation" 2004-2016, Bern, Dezember 2012.

299 http://www.sbfi.admin.ch/themen/hochschulen/01641/01671/index.html?lang=de

300 http://www.admin.ch/opc/de/federal-gazette/2012/3099.pdf (Appendix 10.3).

301 Eidgenössisches Volkswirtschaftsdepartement, Beiträge des Bundes und der Kantone an den Bereich „Bildung, Forschung und Innovation" 2004-2016, Bern, Dezember 2012.

302 Benedetto Lepori, Jeroen Huisman, Marco Seeber, Convergence and differentiation processes in Swiss higher education: an empirical analysis, in: Studies in Higher Education, 2012, 1-22.

303 SNF, 2013 – Forschungsförderung in Zahlen, Bern.

304 KTI Tätigkeitsbericht 2013, Bern.

Figure 68 Funding from SNSF, CTI, FP7 by type of research organisation

SNSF research funding 2013	In million CHF	%
Universities	496.0	61
ETH domain	188.2	23
Universities of applied sciences	19.4	2
Others	115.2	3
Total	**818.8**	**100**
CTI project funding 2013		
Universities of Applied Sciences	51.1	47
ETH domain	33.5	31
Universities	14.0	13
CSEM and other research institutes	10.9	10
Total	**109.5**	**100**
FP7 (2007-2012)*		
ETH domain	624	40
Universities	441.2	28
Universities of Applied Sciences	43.2	3
Others (industry, SMEs, not-for-profit organisations etc.)	451	29
Total	**1559,4**	**100**

Sources: SNF-Forschungsförderung in Zahlen 2013; KTI-Tätigkeitsbericht 2013; SBFI, Beteiligung der Schweiz am 7. Europäischen Forschungsrahmenprogramm, Zwischenbilanz 2007–2012, Zahlen und Fakten; eigene Auswertungen.

Institutional vs. competitive funding

In 2010, cantonal universities' funding for teaching and research was 80% institutional, while they received 11% of their funding from the three competitive sources SNSF, CTI and EU. For the ETH domain this percentage is slightly higher (13,5%) but it also includes sectoral research.[305] In comparison, universities of sciences' funding was 76% institutional, while they received a little more than 3% of their funding from the three competitive sources SNSF, CTI and EU.[306]

[305] ETH-Rat, Akzente 2012, Budgetbericht des ETH-Rats über den ETH-Bereich. We have refrained from adding the ETH domain to Figure 69 due to the use of different categories of funding streams.

[306] Source: Eidgenössisches Volkswirtschaftsdepartement, Beiträge des Bundes und der Kantone an den Bereich „Bildung, Forschung und Innovation" 2004–2016, Bern, Dezember 2012.

Figure 69 Funding structure of cantonal universities and universities of applied sciences (teaching and research)

2010	Cantonal universities		Universities of applied sciences	
	In million CHF	In %	In million CHF	In %
Institutional funding				
University cantons	2527	55.0	816	43.5
Other cantons	482	10.5	208	11.1
Confederation	679	14.8	399	21.3
Competitive funding				
SNSF/CTI/EU	493	10.7	62	3.3
Other				
Other funding (including contract research)	260	5.7	191	10.2
Tuition fees	150	3.3	198	10.6
Total funding	**4591**	**100**	**1874**	**100**

Source: Source: Eidgenössisches Volkswirtschaftsdepartement, Beiträge des Bundes und der Kantone an den Bereich „Bildung, Forschung und Innovation“ 2004–2016, Bern, Dezember 2012

Having said that, due to the much smaller size of research funding in their block grant, UAS are more dependent on competitive funding for their research activities. Overall, the UAS funding system is more competitive than that of universities. Competition in education is based on student numbers while in research it is based on the acquisition of competitive grants.[307]

E.4.3 Changes and trends in funding of HEI

Institutional funding by the confederation and the cantons for the cantonal universities has grown steadily since 2004. Hence, the shares of funding by the confederation and the cantons have more or less remained the same. The same trend can be observed with regard to the universities of applied sciences. [308].

An increase in institutional funding can also be seen for the ETH domain (for whose funding only the confederation is responsible). The budget appropriation for the period 2013-2016 is CHF 9583,9 million (EUR 7980,7 million), with annual instalments rising steadily.

[307] Benedetto Lepori, Jeroen Huisman, Marco Seeber, Convergence and differentiation processes in Swiss higher education: an empirical analysis, in: Studies in Higher Education, 2012, 1-22.

[308] Eidgenössisches Volkswirtschaftsdepartement, Beiträge des Bundes und der Kantone an den Bereich „Bildung, Forschung und Innovation“ 2004–2016, Bern, Dezember 2012.

Figure 70 Institutional funding to the ETH domain

	In million CHF	In million EUR	Annual increase in %
2012	2174.5	1812.1	-
2013	2271.4	1892.8	4.5
2014	2364.2	1970.2	4.1
2015	2456.6	2047.2	3.9
2016	2551.7	2126.4	3.9

Source: Budgetbericht 2014 des ETH-Rats für den ETH-Bereich, Zürich.

Budgets for the SNSF and the CTI have also increased over the years. For example, the SNSF's budget increased from CHF 749 million (€624 million) in 2009[309] to CHF 960 million (€799 million) in 2013[310]. Similarly, the CTI's budget for project funding increased from CHF 77 million in 2005 to CHF 111 million in 2013.

E.5 System of accreditation and quality control

E.5.1 Accreditation

The new Act on the Higher Education Sector (HFKG)[311] coming into effect in the beginning of 2015 will lay the foundation for an accreditation council responsible for quality assurance in higher education.[312] Institutional accreditation, which currently is on a voluntary basis for universities[313], will become a requirement for eligibility to use the designation "University", "University of Applied Sciences" or "University of Teacher Training" or any derived name (article 29 HFKG).

Based on the current Act on Universities of Applied Sciences (article 17a), UAS and their study programmes have to be accredited.[314] Since the beginning of 2008 the OAQ has officially been recognised as the agency for the accreditation of UAS.[315]

E.5.2 Quality audits

Based on the current the Federal Act on Financial Aid to Universities (UFG), universities must, in order to receive funding from the confederation, "provide high-quality services that have been evaluated by the organisation responsible for quality assurance". The organisation for quality assurance is the OAQ. The OAQ performs so-called quality audits which assess the internal quality assurance systems of public universities.

Quality Audits are procedures which focus on the internal quality assurance systems of public universities. They are conducted in a four-year cycle. Quality criteria are used to assess how the internal quality assurance system of a university functions and how it benefits the study programmes.

[309] Schweizerischer Nationalfonds, Jahresrechnung 2010, Bern

[310] Schweizerischer Nationalfonds, Jahresrechnung 2013, Bern.

[311] http://www.sbfi.admin.ch/themen/hochschulen/01640/index.html?lang=en (in English)

[312] http://www.swissuniversities.ch/en/home/

[313] http://www.oaq.ch/pub/de/03_01_00_akkredit_hochschul.php

[314] http://www.sbfi.admin.ch/fh/02145/index.html?lang=en

[315] http://www.oaq.ch/pub/en/akkredit_fh.php

E.6 Feedback on the structure and characteristics of the HEI system

- The Swiss HE sector is a complex institutional system. It is not only a dual system with universities and UAS but also has two types of universities – federal and cantonal. Accordingly, responsibilities for HEIs lie in different hands, federal and cantonal, depending on the individual HEI.
- This complex institutional system is reflected in a complex funding system, with various funding streams from cantons and the confederation. Funding for the different types of HEIs is largely separated. While block grants is the normal funding mechanism, formulas (for calculating the block grant) and performance agreements (for steering the use of funding) are also used.
- The governance and coordination of the HE system is going to be changed with the new Act on the Higher Education Sector. However, the confederation's and cantons' responsibilities will remain the same. Therefore, while coordination and funding will be better aligned, scope for simplification is limited.
- There have been steady, small increases in HEI funding, both in terms of institutional funding and competitive funding. All types of HEIs have a high degree of institutional funding. At the same time the HE sector is a very performing system, as we will see in the next chapter below, meaning that high performance is not necessarily linked to competition in the funding system.
- Universities are generally well-endowed, with an internal culture and governance mechanisms that support and sustain high-quality research and strong quality drivers.316
- Tiny by international comparisons, the government research institute sector is embedded in the federal university system. Altogether, the number of universities is comparatively low and funding has therefore been distributed to relatively few (two federal universities and ten cantonal ones, two of which are also fairly small).
- There is clear division of labour between the private und the public sector, with the public sector focusing mainly on the funding of education and basic research, and the private sector funding applied research and experimental development.

Performance of the Swiss HEI system

E.7 Education[317]

E.7.1 Access

The dual structure of the Swiss education system – i.e. its division into a sector pursuing general education and a sector pursuing vocational education and training – is also reflected in pathways of access to higher education (tertiary sector A). About three quarters of those who obtain their baccalaureate from a general education upper secondary school (gymnasium, lycée) wish to study at a conventional university, while the great majority of those who obtain a federal vocational baccalaureate[318] and enter higher education opt to study at a UAS. Hybrid pathways – i.e. a general education format at upper secondary level followed by a degree at a UAS or basic vocational

316 Gunnar Öquist, Mats Benner, Fostering breakthrough research: a comparative study, December 2012.

317 This chapter relies heavily on: Swiss Coordination Centre for Research in Education, Swiss Education Report 2014, Aarau 2014.

318 Young people who obtain a federal vocational baccalaureate have normally completed an apprenticeship.

education followed by a degree at a university – are not so common, but due to the permeability of the education system they are feasible.

Figure 71 Access to tertiary education and adult learning

Access	2008	2010	2011	2012	2013
Graduation rate from upper secondary programmes designed to prepare students for tertiary education (ISCED 3A)	n/a	n/a	n/a	35	n/a
Entry rate into tertiary education (type A)	n/a	33	44	44	n/a
Students enrolled in tertiary education (number of students in thousands)	233.5	248.6	257.7	269.6	n/a
Tertiary educational attainment (% of population aged 30-34)	43.4	44.2	43.8	43.8	46.1
Share of women among tertiary students	49.7	49.2	49.2	49.3	n/a
Tertiary education participation (number of students in thousands)	233.5	248.6	257.7	269.6	n/a
Participation rate in education and training at any level (in the last 4 weeks)					
• Age 25-34	31.3	37.1	35.7	36.0	36.9
• Age 35-44	23.9	30.5	30.9	30.7	31.1
• Age 45-54	22.6	31.0	29.6	29.7	29.7
• Age 55-64	17.3	23.1	22.5	22.5	23.0

Sources: OECD EaG 2012–2014; Eurostat.

The likelihood of studying at tertiary level is strongly influenced by social origin. For all the political efforts to offer all young people equal educational opportunities, the children of parents with academic degrees are still much more likely to obtain a tertiary A qualification. Compared with a situation of absolute equal opportunity, the children of parents with academic degrees are about 1.5 times as likely to study in the tertiary A sector; in neighbouring countries (Germany, Austria, France, Italy), however, this ratio lies between 1.8 (Italy) and 3.2 (Germany).

Differences in social selectivity can furthermore be observed between the different types of tertiary A education. It is particularly striking that young people whose fathers hold an academic degree are about twice as likely to attend a conventional university. By contrast, the children of academic fathers at UAS are only over-represented by about 30%, and at universities of teacher education not at all.

In terms of the total number of students at *university*, gender distribution is very even. The proportion of female students stood at 51% in 2012. The choice of subjects, however, remains highly gender-specific. Gender-specific study preferences are proving very stable over time. Nevertheless, gender segregation has declined somewhat in the technical sciences and in the exact and natural sciences during the last twenty years.

At the *UAS*, male students are still slightly in the majority. However, the proportion of female students has risen by about 20 percentage points since 2000, accounting for 47% in 2012 (excluding students in continuing education and training). The big increase in the percentage of women is essentially due to the integration/growth of departments with a female predominance. Like at universities, there are still substantial differences between men and women when it comes to choosing a subject. The gaps are particularly wide in the fields of technology/IT and health.

E.7.2 Graduation

With a higher education (tertiary A) rate of 24% among the employable population, Switzerland ranks midfield on an international scale when it comes to the educational qualifications of adults. The same can be said for the tertiary B rate. If the two are

added together, however, one person in three in Switzerland holds a tertiary qualification (Figure 72).

The rise of tertiarisation in Switzerland is reflected in the fact that the higher education (tertiary A) rate among the younger generation (25 to 34 years) is almost one third higher than for the population as a whole (Figure 72).

Compared to the other benchmark countries (Denmark, Netherland, Finland, Ireland), the percentage of adults who have attained at least upper secondary education is high, particularly among the older generations (Figure 72). This may be due to the dual education system; many of the people who have attained upper secondary level will have completed an apprenticeship.

Figure 72 Education status of the adult population

Graduation	Age band	2010	2011	2012
Percentage of adults who have attained tertiary education (tertiary A and B)	25-34	40	40	41
	35-44	38	39	41
	45-54	33	33	35
	55-64	28	27	29
Percentage of adults who have attained at least upper secondary education	25-34	91	89	89
	35-44	90	87	88
	45-54	89	85	86
	55-64	87	81	82

Source: OECD EaG 2012-2014, OECD EaG 2012-2014

The proportion of Bachelor's degree holders who go on to acquire their Master's degree at a different type of institute is still low, albeit growing. It is important to bear in mind that for most subjects studied at UAS (and the universities of teacher education), a Bachelor's degree is the standard qualification and is regarded by the labour market as an indication of ability to work in the profession concerned. Most Master's courses offered by these institutes are therefore opportunities for specialisation.

Graduation rates can serve as an indicator of the effectiveness of a degree programme or a university.[319] For the last 20 years, about 70% of *university students* have completed their studies successfully within ten years.[320] This means that the graduation rate has remained more or less constant despite the big increase in student numbers over this period (Figure 72). In particular, the greater risk of women failing to complete their studies successfully has fallen over time, in parallel to the growing participation of women. With the Bologna reform, which also brought forward 1st-cycle graduation (Bachelor's degree), the proportion of students successfully completing their studies has hardly increased overall.

Of those students at *UAS* who acquired their admission qualification in Switzerland and began a Bachelor's course at a UAS in 2006, 76% had completed their Bachelor's degree five years later. 16% had dropped out of the course, and the remaining 8% had

[319] However, they rely heavily on both the quality standards applied by the university and the composition of the student population. A low graduation rate may well indicate that a course is subject to stringent requirements, but it could also mean that the course is attracting more students of lower ability or that the quality of education is less good. These questions also arise in Switzerland, where universities cannot choose their students.

[320] Equivalent to a Master's degree. Pre-Bologna students would study for a Lizentiat or Diploma directly.

not yet finished. The continuation rate is particularly high for courses where studies are pursued in parallel to practical experience, as for example in social work. The pass rates and drop-out rates differ from one field of study to the next. One explanation for the differences, apart from different admission procedures (e.g. aptitude tests) and varying proportions of part-time students, may be the varying percentage of female students. On about half the courses, women display higher pass rates than men.

The Bologna reforms have not significantly affected the drop-out rate at UAS; the student pass rate for Bachelor's courses is similar to the rate for the former diploma (*Diplom*) courses. The reason for this is probably that the Bologna reforms have had far less impact on the way studies are organised at UAS than at conventional universities, given that even before the reforms most students usually obtained their degree in three years.

By international comparison, the proportion of STEM graduates among all tertiary A graduates in Switzerland is a little below the average. Also, the ratio of women to men among STEM graduates is much less balanced (1:4) than in many other countries, where only two or three times as many men graduate as women.

E.7.3 Mobility of students

National and international mobility of students is a declared aim of the Bologna reforms. Vertical mobility – changing university after completing a Bachelor's degree – is fairly infrequent (10% of students). More common is horizontal mobility, i.e. changing university during a degree course (exchange semester, work experience). The Bologna target, formulated in Leuven, that by 2020 at least 20% of students should be spending some time studying or gaining work experience abroad, has already been met by 2nd-cycle university students (28%). Among 1st-cycle students at universities the mobility rate is lower, however (16%), suggesting that the rigid structuring of the study programmes might hinder mobility. Reasons for not moving include, especially, additional costs, longer periods of study, organisational effort and incompatibility with the circumstances in which people live or study. Mobility is heavily influenced by the chosen field of study. In certain disciplines, such as pharmacy, the proportion of mobile students is very small, while in the technical sciences more than 40% of students complete an exchange semester.

E.7.4 Employability

Over the last ten years, the employment rate of higher education graduates one year after graduation was between 85% and 95%, depending on the type of university they had attended and the state of the economy.[321] Those graduating from a university of teacher education display the highest employment rate one year after graduation and those graduating from a conventional university the lowest.

[321] Figures differ from figures in Figure 73 due to different definitions and measurements.

Figure 73 Employability – key figures

	2009	2010	2011	2012	2013	2014
Employment rate by highest level of education attained (y15-64), %						
• Tertiary (ISCED 5-6)	87.5	87.0	87.0	87.3	87.6	87.4
• Upper secondary and post-secondary non-tertiary (ISCED 3-4)	80.1	78.8	78.7	77.8	76.9	76.5
• Less than primary, primary and lower secondary (ISCED 0-2)	61.4	59.4	60.4	60.1	57.7	56.2
Median income by education level (Median equivalised income) in €						
• Pre-primary, primary and lower secondary education (ISCED 0-2)	18,259	18,27	18,691	18,641	19,366	-
• Upper secondary and post-secondary non-tertiary education (ISCED 3 and 4)	20,671	20,742	20,341	20,66	20,887	-
• First and second stage of tertiary education (ISCED 5 and 6)	26,031	25,949	26,334	26,019	26,386	-

Source: Eurostat

The different prospects for entering the labour market as a function of university type are also reflected in the unemployment rate as defined by the ILO.[322] If unemployment is lower for graduates from a UAS than for graduates from a university, that may be due in part to the fact that many university degrees are not tailored to a specific profession and in part to the fact that the average university student has far less vocational experience than the average graduate of a UAS (because the latter have normally completed an apprenticeship), which makes it harder to enter the labour market. But if university graduates fare slightly worse in terms of unemployment rate, this is due in most cases to the difficulties they encounter in the early years of starting out on a career. Five years after graduation, no more gaps can be observed in the unemployment rate as defined by the ILO.

Interestingly, salaries do not differ noticeably for the same age group between qualifications obtained from conventional universities and those obtained from UAS. This may seem surprising at first sight, as (Master's) graduates from universities will have studied for about two years longer than (Bachelor's) graduates from UAS. One major factor in the comparatively high pay earned after studying at a UAS is likely to be the vocational experience that graduates will have acquired both prior and parallel to their studies. This is especially relevant in technology and business administration and services, which are traditional domains of the universities of applied sciences.

Given the increase in tertiarisation rates in recent years (see Figure 71), it would be useful to know whether this tertiarisation is a response to labour market needs or the result of dynamics inherent within the education system to which the labour market has to adapt. We can observe in the case of Switzerland that the growth in student numbers attending higher education has not led to poorer levels of labour market matching. Most university graduates in employment have jobs that require a university degree or are at least appropriate to the professional skills gained in the course of their studies. The proportion of graduates in jobs that match their qualifications rises with each cycle, standing at 62% for 1st-cycle graduates, 90% for the 2nd cycle and 95% for 3rd-cycle (PhD graduates) one year after the degree is achieved.

[322] An unemployed person is a person who was not employed during the reference week and had actively sought work during the four previous weeks.

For graduates of UAS, an analysis of the Graduate Survey of 2011 shows that, both one year and five years after graduation, about 30% of employed graduates were in a job that did not require a university degree. The increase in appropriate employment between these two points in time is extremely small (2–3 percentage points), which means that the problem is not just about getting started. Further analysis shows that of those who, one year after graduating, are in jobs that do not require a university degree, at least a third report that there is a good match between their vocational qualifications and the work they are doing. This reduces the average rate of inappropriate jobs among those in employment to just under 20%. The lower rate of graduates from UAS who have found jobs to match their training may, in part, result from the fact that access to vacancies in certain fields is also possible via basic vocational training (with continuing education and training) or tertiary level B professional education and training (PET), so that a tertiary A degree is not an essential requirement.

In Switzerland, the wage benefit associated with an additional year of education over the past twenty years has been between 5.5% and 6.5%. At 6%, this means that, after qualifying, an individual with five years of study up to Master's degree level can expect a 30% higher wage on average than someone who took up work directly after obtaining their baccalaureate without pursuing any further training. This return to education has been subject to cyclic fluctuations over the past two decades and is showing a slight upward trend. In other words, the general increase in the level of education of the working population has not led to an excessive supply of education which would have served to erode the individual's return on this investment.[323]

Private return on investments (compared to the next lower educational achievement) are particularly high for graduates of UAS (10.6% for men, 8.7% for women) while rates of return for graduates of universities are lower (5.4% for men, 2.2% for women).[324]

E.8 Research

E.8.1 Research output

Since the beginning of the 1980s the number of publications worldwide has increased dramatically; nowadays, it is 2.7 times higher than 40 years ago. This increase is due to the industrialised countries publishing more; however, the newly industrialised countries (in particular China, South Korea, Brazil, Turkey) have become more active too.[325] Despite strong competition Switzerland could slightly increase its share of worldwide publications, from 1.0% in the 1980s to currently 1.2% (Figure 74).

[323] Swiss Education Report 2014.

[324] Stefan C. Wolters, Bernard Weber, Bildungsrendite – ein zentraler ökonomischer Indikator des Bildungswesens, in: Die Volkswirtschaft, 10-2005.

[325] Staatsekretariat für Bildung und Forschung, Bibliometris.che Untersuchung zur Forschung in der Schweiz 1981-2009, 2011.

Figure 74 Swiss share of worldwide publications, by field

	1981–1985	1995–1999	2005–2009
Number of publications	41,000	80,000	125,000
Number of publications per 1000 inhabitants	1.3	2.3	3.2
Number of publications per 1000 researchers	n/a	737	987
Share of worldwide publications	1.0%	1.2%	1.2%
• Technical and engineering sciences, computer sciences	0.8%	0.9%	1.0%
• Physics, chemistry, geosciences	1.2%	1.3%	1.2%
• Agriculture, biology and environmental sciences	0.7%	1.0%	1.2%
• Life sciences	1.2%	1.3%	1.3%
• Clinical medicine	1.4%	1.4%	1.4%
• Social and behavioural sciences	0.5%	0.4%	0.9%
• Humanities and arts	0.3%	0.4%	0.5%

Source: Staatsekretariat für Bildung und Forschung, Bibliometrische Untersuchung zur Forschung in der Schweiz 1981–2009, 2011

In the three areas of physics, chemistry, geosciences; life sciences; and clinical medicine, the Swiss share of worldwide publications has remained practically the same. At the same time, the number of publications in these areas is above the Swiss average. This points to the strengths of these areas.

If the number of publications is normalised by country size, Switzerland – together with Finland – is the most productive country (3.2 publications per 1000 inhabitants) (Figure 75). If the number of publications is normalised by size of the R&D system, Switzerland is the second most productive country, after Italy and before the Netherlands.[326] As can be seen in Figure 75, at the beginning of the 1980s the impact of Swiss publications, as measured by relative citations, was slightly above the worldwide mean. Since then, it has increased by 15 points (from 101 to 116) and was 16% above the mean in the period 2005–2009. Relative citation was highest in the technical and engineering sciences/computer science and physics, chemistry, geosciences, followed by life sciences.

[326] Staatsekretariat für Bildung und Forschung, Bibliometrische Untersuchung zur Forschung in der Schweiz 1981-2009, 2011.

Figure 75 Impact of Swiss publications (relative citations), by field (100=worldwide mean)

	1981–1985	1995–1999	2005–2009
Impact	**101**	**108**	**116**
• Technical and engineering sciences, computer sciences	122	120	124
• Physics, chemistry, geosciences	126	120	128
• Agriculture, biology and environmental sciences	87	111	118
• Life sciences	108	111	116
• Clinical medicine	72	83	107
• Social and behavioural sciences	43	73	94
• Humanities and arts	79	44	91

Source: Staatsekretariat für Bildung und Forschung, Bibliometrische Untersuchung zur Forschung in der Schweiz 1981–2009, 2011

Comparing Swiss impact with other nations' impact, Switzerland ranks first in technical and engineering sciences, computer sciences; physics, chemistry, geosciences; and life sciences (Figure 76). Compared to Swiss publications, Finnish publications have a comparable impact in clinical medicine and a higher impact in the humanities and arts.

Figure 76 Impact ranking of countries, by field (2005–2009)

Rang	Technical and engineering sciences, computer sciences	Physics, chemistry, geosciences	Agriculture, biology and environmental sciences	Life Sciences	Clinical medicine	Social and behavioural sciences	Humanities and arts
1.	Switzerland	Switzerland	Netherlands	Switzerland	USA	USA	USA
2.	USA	Netherlands	Denmark	USA	Netherlands	UK	UK
3.	Denmark	USA	Belgium	UK	Belgium	Netherlands	Netherlands
4.	Netherlands	Denmark	Switzerland	Netherlands	Denmark	Denmark	New Zeeland
5.	Singapore	Germany	Sweden	Austria	Switzerland	Canada	**Finland**
6.	Belgium	UK	UK	Germany	Sweden	Belgium	Israel
7.	Sweden	Austria	Singapore	Belgium	**Finland**	Switzerland	Denmark
8.	Israel	France	USA	Denmark	Austria	Israel	Germany
9.	Germany	Sweden	France	Sweden	Canada	Sweden	Canada
10.	France	Canada	Germany	France	UK	Australia	Norway

Source: Staatsekretariat für Bildung und Forschung, Bibliometrische Untersuchung zur Forschung in der Schweiz 1981–2009, 2011

Our analysis so far shows that Switzerland is both a productive and successful research nation, in terms of number of publications and the frequency with which they are cited. This result is confirmed by Figure 77, which presents slightly newer figures. Switzerland has the highest rate of high-quality publications among OECD countries.

Figure 77 Quantity and quality of scientific production in Switzerland, 2003–2011

Number of publications	**246,879**
Percentage of excellence*	**19.6**
*The "top-cited publications" are the 10% most cited papers in each scientific field	

Source: OECD STIS 2013

E.8.2 Relative share in EU and ERC funding

In the context of FP7, Swiss researchers are mostly active in the programmes "Idea" (ERC) (28% of funding), in ICT (19%) and Health (12%). By 15 June 2012[327] Swiss researchers were awarded a total of CHF 1 559 billion, which corresponds to 4.3% of all FP7 funding.[328] The preliminary rate of return is 1.52, meaning that Swiss researchers could secure about 1.5 times the amount of funding that they would have received if funding had been allocated based on the contributions made by EU member states and associated countries to FP7.[329]

Although the European Research Council (ERC) has only been in existence since 2007, its grants have become a sign of excellence in research. As can be seen in Figure 78, many grants ERC grants have gone to researchers in Switzerland. The numbers are considerably higher than for Finland. ERC grants are mostly awarded to Swiss researchers in the physical sciences and the life sciences, less so in the social sciences and humanities.[330]

Figure 78 Swiss ERC grants, by year and type of grant

ERC funding per year of calls (number of grantees)	2009	2010	2011	2012	2013
Starting Grant	22	28	23	36	21
Consolidator Grants	-	-	-	-	23
Advanced Grant	31	20	21	25	25
Proof of Concept	-	-	4	5	5
Synergy Grants	-	-	-	0	1

Source: http://erc.europa.eu/projects-and-results/statistics

E.8.3 Internationalisation

The Swiss research system is highly internationalised. Compared with the other benchmark countries and Finland, international mobility of scientific authors is high; in particular the percentage of 'stayers' who are not mobile is noticeably lower. The percentage of new inflows is the highest in the whole of the OECD. This testifies to the attractiveness of the Swiss research system for researchers, offering them favourable conditions for research (e.g. availability of funding through the Swiss National Science

[327] No newer figures available.

[328] SBFI, Beteiligung der Schweiz am 7. Europäischen Forschungsrahmenprogramm, Zwischenbilanz 2007–2012, Zahlen und Fakten, 2013.

[329] SBFI, Auswirkungen der Beteiligung der Schweiz am 7. Europäischen Forschungsrahmenprogramm, 2014.

[330] Andreas Balthasar, Oliver Bieri, Barbara Good, Beteiligung und Erfolg der schweizerischen Geistes- und Sozialwissenschaften an den Grants des European Research Council. Schlussbericht zuhanden des Schweizerischen Nationalfonds zur Förderung der wissenschaftlichen Forschung SNF, Interface/Technopolis, Luzern und Wien, 5. Dezember 2013.

Foundation). However, this also implies that demand for researchers (and more generally knowledge intensive workers) is not fully met by the educational system, with universities and firms relying on large inflow of foreign researchers. While this is a sign of openness and attractiveness, it also suggests that the system may become vulnerable if these conditions change.[331]

Figure 79 Internationalisation of the Swiss research system

Internationalisation		**2011**
International mobility of scientific authors, 1996-2011 (as a percentage of authors with two or more publications, by last reported affiliation)	Stayers (no mobility)	80.7
	Returnees	8.5
	New inflows	10.8
International collaborations as a percentage of scientific publications, 2003–2011		51.91

Source: OECD STIS 2013

Co-publications is another indicator to gauge internationalisation of research. In the period between 2003 and 2011, international collaborations as a percentage of scientific publications was 51.91%, on a par with Denmark.

Most of the co-publications in which Swiss researchers are involved in are international co-publications rather than national co-publications. International co-publications (as a percentage of total co-publications) increased from 52.1% in the early 1985s (1991–1985) to 69.3% in the period 2005–2009, implying a 17% increase in international collaborations. Co-publications are mostly with authors from the United States, followed by authors from the neighbouring countries.[332]

E.8.4 University rankings

As can be seen in Figure 80, five of the twelve Swiss universities are well represented in the international university rankings. This not only concerns the two federal institutes of technology but also cantonal universities. In the Shanghai Ranking 2014, the ETH Zurich (ranked 19th), University of Zurich (56th), University of Geneva (66th), University of Basel (90th) and the EPFL (96th) were ranked among the 100 best universities worldwide. The QS ranking and the Times Higher Education Ranking show similar results. While the QS ranks the ETHZ 12th, followed by EPFL (17th), the University of Zurich (57th) and the University of Geneva (85th), the Times Higher Education Ranking only lists three Swiss universities, with ETHZ ranked 14th, EPFL 37th and the University of Basel 74th. In all three rankings, the ETHZ is the best ranked university in continental Europe.

Figure 80 University rankings

University rankings	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Source**
No. of universities top 100 Shanghai	3	3	4	4	4	5	Shanghai Ranking
No. of universities top 100 QS	4	na	3	4	4	4	QS Ranking
No. of universities top 100 Times Higher	na	4	3	3	3	3	Times Higher Education Ranking

[331] Marco Seeber, ERAWATCH Country Reports 2013: Switzerland, JRC Science and Policy Reports, 2014.

[332] Staatsekretariat für Bildung und Forschung, Bibliometrische Untersuchung zur Forschung in der Schweiz 1981-2009, 2011.

E.9 Third mission

There is a long tradition of collaboration between research institutes, universities and private companies favoured by informal contacts and transfer of people. Traditionally, cooperation between public and private R&D performers and the transfer of research results has been left to bilateral contacts between universities and companies with little intervention from the state.[333]

However, the focus on interaction between HEIs and the surrounding communities has increased significantly in recent decades. When the UAS were established in the 1990s, they were given an explicit mission to engage in knowledge transfer. Knowledge and technology transfer is one of the strategic priorities in the performance agreement between the confederation and the ETH domain. The ETH domain is called upon to further develop its knowledge and technology transfer strategy and to implement it.[334] In cantonal universities the third mission appears to be less explicit. For example, in the law governing the University of Zurich, research and teaching are mentioned as missions while the university is also tasked to provide services in these contexts.[335] Having said that, the University of Zurich maintains a technology transfer office, in cooperation with the universities of Berne and Basel.[336] Most other HEIs run a transfer office too; for example, the ETH Zurich runs ETH transfer.[337]

While the CTI, Switzerland's innovation agency, has always dedicated most of its budgets to funding cooperation projects between SMEs and HEIs, in 2013 it launched a new knowledge and technology transfer strategy to support the innovation activities of Swiss companies.[338] The strategy comprises three new initiatives:

- National thematic networks
- Support to SME through innovation mentors
- Information and networking through physical and web-based platforms

The knowledge and technology transfer strategy aims to bring together SMEs and HEIs where this does not happen automatically and to initiate collaborations that act as drivers for innovation for the whole of Switzerland (rather than just generating new CTI-funded projects).

Generally, indicators paint a positive picture of science industry linkages in Switzerland. Public private scientific co-publications are 80 percentage points higher than the EU average.[339] With regard to patent applications, patent applications[340] per billion GDP (in PPS€) are 42 percentage points and patent applications[341] per billion GDP (in PPS€) in societal challenges, that is in environment-related technologies and health, 60 percentage points higher the EU average. Switzerland's relative weakness is in having below EU average shares in SMEs collaborating with other firms (9.4% compared to 11.7% for the EU).[342]

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[333] Marco Seeber, Erawatch Country Reports 2013: Switzerland, Luxembourg 2014.

[334] BFI-Botschaft.

[335] Gesetz über die Universität Zürich (Universitätsgesetz) vom 15. März 1998, article 2.

[336] http://www.unitectra.ch/en

[337] https://www.ethz.ch/en/the-eth-zurich/organisation/staff-units/eth-transfer.html

[338] http://www.kti.admin.ch/netzwerke/00194/index.html?lang=de

[339] European Commission, Innovation Union Scoreboard 2014, Brussels.

[340] Patent applications under the Patent Cooperation Treaty (PCT). By filing one international patent application under the PCT, applicants can simultaneously seek protection for an invention in 148 countries throughout the world.

[341] Patent applications under the Patent Cooperation Treaty (PCT).

[342] European Commission, Innovation Union Scoreboard 2014, Brussels.

E.10 Cost effectiveness

Educational expenditure for teaching and research at tertiary level A is high in Switzerland by international comparison. A significant reason for this lies in the heavy emphasis on research activities at Swiss universities, which is also reflected in the high proportion of doctorates.[343] If teaching costs (in terms of GDP per capita) are taken on their own, then Switzerland is one of the countries where expenditure is at present relatively low. In part, however, this finding could stem from the fact that Switzerland has witnessed above-average economic per-capita growth in recent years, whereas reference countries have been experiencing stagnating or receding economies.[344] Studies assessing the comparative efficiency of tertiary education systems in different countries typically find a very high level of efficiency in Swiss universities.[345]

R&D funded by the government (in % of GDP) is only slightly above the EU27 average, meaning that the relative effort of the public sector is not particularly high (Figure 67). However, as shown above, the performance of the research system is excellent. This points to a very good cost benefit ratio.

E.11 Conclusions

- Switzerland has a strong HE system, with five out of twelve universities among the top 100 universities in the world. An important asset of the education system is the employability of its graduates.
- In the case of Switzerland we can observe that the growth in student numbers attending higher education has not led to poorer levels of labour market matching. Most university graduates in employment have jobs that require a university degree or are at least appropriate to the professional skills gained in the course of their studies. Also, the general increase in the level of education of the working population has not led to an excessive supply of education which would have served to erode the individual's return on this investment.
- On the contrary, demand for knowledge intensive workers (including researchers) is not met fully by the education system, with universities and firms relying on large inflows of foreign workers.
- There is a fairly high social selectivity in access to higher education although not as high as in the neighbouring countries. The higher the social status, the higher the probability to study at a university (rather than at a UAS or a university of teacher training).
- Switzerland also has an open, excellent and attractive research system. The Swiss research system is particularly strong in the natural, engineering and life sciences, and has been so for decades, as bibliometric data show. Against this background the slightly below average proportion of graduates in STEM subjects is perhaps not ideal. The research system is less strong in the social sciences and in particular the humanities.
- Different indicators suggest that the HEI system quite an efficient system, perhaps despite the complex institutional and funding structures.

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[343] Switzerland has the largest graduation rate at doctoral level of all OECD countries, reaching 3.4% in 2009.

[344] Swiss Education Report 2014.

[345] Agasisti, T., Performances and spending efficiency in higher education: a European comparison through non-parametric approaches, Education Economics, (2), 2011, p. 199–224; Bolli, T., Essays on the Production and Measurement of Knowledge Capital, KOF Dissertation Series No. 9, Zurich, October 2011.

E.12 National policies

For the first time, education, research and innovation has been defined as a priority in the federal government's programme for the legislative period 2011–2015 (as one of seven priority areas), formulating the following policy aims:[346]

- Consolidate the high quality and good international reputation of the Swiss HE system and Swiss research
- Promote the development of skilled labour for science and the economy and increase the educability and employability of young people (in particular migrants)
- Optimise framework conditions for lifelong learning

Research, innovation and education policies generally have a very strong position and benefit from wide political support. The Swiss commitment to research dates far back in history and reflects the country's lack of raw materials and the concomitant drive to develop a knowledge-based economic growth strategy, led by federal and cantonal universities.

At federal level, Swiss education, research and innovation policy is governed by the White Paper on Education, Research and Innovation (the ERI message) that defines strategic priorities and forms the basis for the Federal Parliament to grant funds. It provides information on the national science, higher education and innovation system and its challenges, and measures to address them, providing the Federal Parliament with the rationale for changes in law and budget decisions. The ERI message does not specify thematic priorities, the rationale being that researchers and HEIs should decide for themselves in what areas they would like to invest and conduct research.[347] However, other types of priority choices are made. For example, in the ERI message 2013–2015 research infrastructures and the promotion of young researchers have been explicitly prioritised.

Having said that, the Swiss HEI system is a highly decentralised system, characterised by decentralised decision making. Being a very decentralised system, strategic decisions are generally left to the individual institutions, the rationale being that they know best how and what to prioritise.

The decentralisation of the science system goes hand in hand with a bottom-up multi-stakeholder approach to policy making. The Swiss political system ensures that all relevant stakeholders are included in decision-making. It is characterised by a consensus-driven development of public policies, where regulations by and large follow the creation of consensus among relevant actors.[348]

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[346] http://www.bk.admin.ch/themen/planung/04622/index.html?lang=de

[347] An exception to the rule is energy research, which has recently been prioritised by the federal government. Following the Fukushima incident, the Federal Council (executive) and the Federal Parliament decided in 2011 to phase out nuclear energy over the coming decades. The new "Energy Strategy 2050" foresees a massive reduction in energy use and an increased use of renewable energy. In order to underpin the restructuring of the Swiss energy system and ensure energy supply, the Federal Council and the Federal Parliament argue that energy research in Switzerland needs to be strengthened. The efficient and sustainable use of energy is also one of the seven priority areas of the government in the legislative period 2011–2015.

[348] Benedetto Lepori, Jeroen Huisman, Marco Seeber, Convergence and differentiation processes in Swiss higher education: an empirical analysis, in: Studies in Higher Education, 2012, 1-22.

As mentioned above, the institutions governing and coordinating Swiss higher education are currently being reformed. This is a truly major reform. The process started out in 2006 with a constitutional referendum and is still ongoing. An important milestone in the reform is the new Federal Act on Funding and Coordination of the Higher Education Sector (HFKG)[349], passed by Federal Parliament in September 2011. It will come into effect at the beginning of 2015.[350] The new law will overhaul institutions governing and coordinating Swiss higher education. It will also define access requirements to higher education institutions and lay the foundations for an accreditation council responsible for quality assurance in higher education. However, it will not touch the responsibilities of cantons and the confederation for 'their' HEIs, meaning that funding streams will continue to come from different state levels (confederation and cantons). But the HEIs system as a whole will be better aligned and coordinated.

A major issue for the HEIs are the consequences of the constitutional referendum from February 2014 in which Swiss voters decided to re-introduce fixed quotas for immigrants, thus putting the Swiss-EU Bilateral Agreement on Free Movement of Persons in question. The acceptance of the mass immigration initiative has resulted in Switzerland being excluded from European research funding and led to non-association in the European research programme Horizon 2020. In the meantime, Switzerland and the EU have agreed on a partial association to the first pillar of Horizon 2020 ("Excellent Science"), which encompasses the ERC. Given the high number of ERC grants that researchers in Switzerland win and given the reputation they carry, this is important as it could have negative impact on Swiss research. More generally, if the free movement of persons between Switzerland and the EU is suspended, the openness of the Swiss HEI system is endangered, with HEIs presumably having more difficulty in filling vacant positions with suitable candidates.

E.13 Institutional policies

E.13.1 Level of autonomy of institutions

The first university in Switzerland to become autonomous was the University of Basel in 1996. Since then, all other universities in Switzerland have become autonomous. The regulations are different from one university to another (because they have different owners), but the impact of regulations have been more or less the same, at least in German-speaking Switzerland, where direct steering by the owners has been minimised.[351] Universities receive a block grant approved by parliament and can decide for themselves how to spend the money.

In the Swiss HE system, there has always been a strong tradition of autonomy for professorial chair holders; this has been slightly modified over time, with the introduction of external evaluations and internal leadership discretion (and great variation among universities). Traditionally, academic leadership was largely symbolic and real power resided with the collegiate bodies, but gradually this has been altered and academic leaders now control larger shares of resources and recruitment. The primary function of the academic leadership has been to control appointments, especially for the federal universities. The two federal universities, and in particular ETH Zurich, are renowned for their rigorous recruitment strategy.

A tenure track model has only recently been established, and only in some universities. This is one of weak spots in the Swiss HE system. ETHZ, for instance, has devolved the responsibility to the departments, only half of which have established tenure track; EPFL, in contrast, has introduced it throughout the university. Hence, conditions for

349 http://www.sbfi.admin.ch/themen/hochschulen/01640/index.html?lang=en (in English)

350 http://www.swissuniversities.ch/en/home/

351 https://unigeschichte.unibas.ch/550-jahre-im-ueberblick/juengste-geschichte-ab-1985/aufbruch-in-die-autonomie/aufbruch-in-die-autonomie.html

junior scholars are uneven in Switzerland, although the rise of EPFL (see below) and its aggressive global recruitment of young faculty members seem to have triggered responses throughout the system.[352]

However, a study by the European University Association (EUA) from 2012 shows that Swiss universities are not very autonomous compared to its counterparts in other European countries.[353] Figure 81 shows the four dimensions of autonomy (organisational, financial, staffing, academic) and the indicators used to measure them.

Figure 81 Definition of autonomy

Organisational autonomy	**Financial autonomy**	**Staffing autonomy**	**Academic autonomy**
Selection procedure for the executive head	Length and type of public funding	Capacity to decide on recruitment procedures (senior academic/senior administrative staff)	Capacity to decide on overall student numbers
Selection criteria for the executive head	Ability to keep surplus	Capacity to decide on salaries (senior academic/senior administrative staff)	Capacity to select students (BA, MA)
Selection criteria for the executive head	Ability to borrow money	Capacity to decide on dismissals (senior academic/senior administrative staff)	Capacity to introduce programmes (BA, MA, PhD)
Term of office of the executive head	Ability to own buildings	Capacity to decide on promotions (senior academic/ senior administrative staff	Capacity to terminate programmes
Inclusion and selection of external members in governing bodies	Ability to charge tuition fees for national/ EU students (BA, MA, PhD)		Capacity to choose the language of instruction (BA, MA)
Capacity to decide on academic structures	Ability to charge tuition fees for non-EU students (BA, MA, PhD)		Capacity to select quality assurance mechanisms and providers
Capacity to create legal entities			Capacity to design content of degree programmes

Source: European University Association

The study found that Swiss universities are not very autonomous compared to its European counterparts. This pertains mostly to the election of rectors and members of university councils, funding and the selection of students. In contrast, Swiss universities are very autonomous in the recruitment of faculty – which is reflected in careful international recruitment strategies. Figure 82 compares the autonomy of Swiss HEIs with Finnish HEIs and shows that, with the exception of staffing autonomy, Finnish HEIs are consistently more autonomous than Swiss HEIs.

[352] Gunnar Öquist, Mats Benner, Fostering breakthrough research: a comparative study, December 2012.

[353] Thomas Estermann, Terhi Nokkala, Monika Steinel, University Autonomy in Europe II. The Scorecard, a study by the European University Association, Brussels, 2012.

Figure 82 Comparison autonomy of Swiss HEIs with Finnish HEIs

	Organisational autonomy	Financial autonomy	Staffing autonomy	Academic autonomy
Finland	high	medium high	high	high
Switzerland	medium low	medium low	high	medium high

Source: European University Association

E.13.2 EPFL as an example of institutional transformation

EPFL is one of the universities that are highly ranked in the various university rankings. While for a long time considered the 'little sister' of the ETHZ, it has changed tremendously, transforming into a very entrepreneurial university making it an outstanding example of institutional innovation. EPFL went through an organisational reform at the beginning of this millennium. It began with the arrival EPFL's new president in March 2000 who was very much a driver behind this reform. Goals of the reform were:

- Reorganisation of EPFL into 5 schools led by deans with extended competences
- Creation of a new School of Life Sciences
- Creation of two colleges (social sciences and humanities, management of technology)
- Implementation of a tenure track system
- Implementation of a doctoral school
- Reinforcement of technology transfer activities
- Development of strategic partnerships with large corporations
- Building a lively and sustainable campus

The reform reduced the number of departments from twelve to four schools. At the same time, because life sciences was considered to become the most promising research area in the next 20 years, a new school was founded – the School of Life Sciences. Moreover, two colleges were established – the College of Management and Technology and the College of Human Sciences. The main difference between colleges and schools is that the former are smaller and do not offer bachelor education.

The reform process was most active in 2001, when a great deal of consultation and reorganisation was going on. The reform was completed in January 2002 – that is within 18 months. The idea was to pull through the reform as quickly as possible because too much talking would only dilute it. Another reason for the quick implementation was that the reform interfered with scientific work; scientific production at EPFL dipped in 2001, because professors were busy with the reorganisation.

Recently, as the first university in continental Europe, EPFL has put a strategic focus on Massive Open Online Courses (MOOCs). In order to consolidate the competences and know-how in MOOCs-related matters and to develop MOOC technologies and practices, EPFL opened EPFL Center for Digital Education on April 1st 2013. The Center aims to foster the adoption of MOOCs both within EPFL and by partners of EPFL. It produces MOOCs for EPFL and its partners (both in English and French, the latter directed to an African audience), operates MOOC-based educational

programmes and carries out research activities on the use of digital technologies in education and training.[354]

Conclusions

Switzerland's knowledge production by higher education (and private firms) is among the best in the world, in terms of productivity as well as quality and societal and economic impact. Switzerland's sustained excellence in higher education reflects its strong political commitment to well-resourced research universities and academic self-governance. This commitment has not declined significantly over time.

The funding streams for HEIs have historically grown and, embedded in a federal system, are complex. But there has been continuity in investment in the HE sector, with a high share of institutional funding. There is an emphasis on a culture of excellence and measures to enhance and sustain focused research efforts. At the policy-making level, priorities are long-term and generally avoid opportunist interventions, concentrating more on the framework conditions.

> *"The Swiss political dedication to university autonomy, long-term funding and a select number of well-endowed universities stands out by European standards and can probably be matched only by the USA and some Asian countries. […]. Switzerland is thus a quiet and stable corner of [the] continent."*[355]

HEIs are autonomous if not as autonomous as its Finnish counterparts, as measured by the EUA. Their autonomy is highest in staffing, which is reflected in careful international recruitment strategies. At same time, being a very decentralised system, there is a strong belief that strategic decisions are generally best left to the individual institutions, the rationale being that they know best how and what to prioritise. Spectacular examples of institutional innovations (EPFL) have been introduced and disseminated, which have had effects on research conditions throughout the country.

Some weakness can be identified in the lack of a consistent career and tenure track system across universities and in the capability to meet the demand of highly skilled workers with internal supply. Emphasis of educational policy has been and remains on excellence and variety of training. Targets in terms of quantity regards the participation rates at upper secondary level rather than increasing the number of graduates.[356] Another potential weakness, or possibly a threat, is the constraints that might follow as a consequence of the Swiss voters' decision to re-introduce fixed quotas for immigrants, thus putting the Swiss-EU Bilateral Agreement on Free Movement of Persons in question. This has led to non-association in the European research programme Horizon 2020 although, in the meantime, Switzerland and the EU have agreed on a partial association to the first pillar of Horizon 2020 ("Excellent Science"), which encompasses the ERC. More generally, if the free movement of persons between Switzerland and the EU is suspended, the openness of the Swiss HEI system is curtailed, with HEIs presumably having more difficulty in filling vacant positions with suitable candidates. This development goes against fundamental ideas of scientific practise, where international mobility and international recruitment of staff are key to top scientific achievements.

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354 http://moocs.epfl.ch/about-us

355 Gunnar Öquist, Mats Benner, Fostering breakthrough research: a comparative study, December 2012, p. 57.

356 Marco Seeber, Erawatch Country Reports 2013: Switzerland, Luxembourg 2014.

Appendix F List of interviewed organisations

Aalto University
Academy of Finland
AKAVA
Arcada Polytechnic
Confederation of Finnish Industries
Haaga-Helia
Kajaani University of Applied Sciences
Lapland University of Applied Sciences
Lappeenranta University of Technology
Ministry of Employment and the Economy
National Institute for Health and Welfare, THL
National Union of University Students in Finland, SYL
Oulo University of Applied Sciences
Tampere University
Tampere University of Applied Sciences
Tampere University of Technology
Technical Research Centre of Finland, VTT
Tekes
The Finnish Education Evaluation Centre (FINEEC), Karvi
Union of Students in Finnish Universities of Applied Sciences, SAMOK
University of Eastern Finland
University of Helsinki
University of Jyväskylä
University of Oulu
University of the Arts Helsinki
University of Turku
University of Vaasa