

## ENGLISH SUMMARY OF AWT-REPORT FOOD FOR THOUGHT. SCIENCE AND INNOVATION IN THE UNITED KINGDOM

### INTRODUCTION

The Dutch Advisory Council for Science and Technology Policy (AWT), which advises the Dutch Government and parliament, is conducting a series of studies on the science and innovation landscapes of different countries. The aim is to find out which factors may contribute to certain successes in the system, to inform professionals, entrepreneurs and the government about systems elsewhere, and to invoke discussion on what the Netherlands can learn from other countries. Science and innovation function as a complex system that is highly interdependent, multi-faceted and non-linear. The studies focus on capturing the key actors, elements and interesting characteristics of each system. The goal is not to copy best practices elsewhere, but to call up new ideas and inspiration for the own policies and system.

The first study, published in 2013, focused on Germany and generated much positive attention in the Netherlands. This second study reports on the United Kingdom of Great Britain and Northern Ireland. The Netherlands and the UK are important political and economic partners and collaborate in a number of different areas, also in EU-context. Both countries have successful science and innovation landscapes and comparative scores on international rankings for innovation. However, the design of the two systems differs strongly, which makes the comparison interesting.

The study was conducted by researchers from SEO Economic Research and the AWT added an introduction. The British embassy in the Hague offered practical support and advice. The study, entitled 'Food for thought', will be presented to the ministers and state secretaries of Education, Culture and Science (OCW) and Economic Affairs (EZ) on July the 7th. The report is in Dutch, with an executive summary in English.

Overall the study concludes that it is not possible to determine whether the UK-system is more successful than the Dutch one or vice versa. The report does identify some striking characteristics of the UK-system, areas in which the UK differs significantly from the Netherlands. The AWT elaborates on six characteristics of the UK system which offer food for thought for Dutch policy makers, scientists and innovators, and are discussed in more detail in the following sections:

1. Strong public commitment to science and innovation
2. Funding of science on the basis of competition, excellence and impact
3. Assessment of science on the basis of excellence and impact
4. A diverse landscape of universities: internationally renowned universities exist next to mediocre ones
5. A strong 'science for policy' approach
6. An attractive business and entrepreneurial climate

## 1 PUBLIC COMMITMENT AND INTEGRATED APPROACH

The British government and the UK-society at large show a strong commitment to science and innovation in many ways. The importance of scientific research, technological development and innovation are acknowledged on both sides of the political spectrum. The British Prime minister shows public support for initiatives such as Tech City and organizes network meetings with representatives at 10 Downing Street. Higher education and science are regarded as important economic sectors with export potential and roles to play in the international profile of the UK, not just as public provisions. Whereas scientific budgets used to be quite stringent, government expenditure on scientific research had recently been kept safe from general cutbacks, which were necessary due to the global economic crisis. This does not apply to innovation budgets though.

In 2009 the UK reorganized the system. The responsibilities for science and innovation were placed together in one department (Business Innovation and Skills - BIS). Thus, science and innovation take up a more central and visible place in government than they used to. BIS collaborates strongly with other departments, who each have their own budgets for sector specific investment in science and innovation. For example, there is extensive collaboration between the UK-agency for innovation (TBS) and the ministry for foreign affairs (FCO), in the form of UK Trade & Invest (UKTI). The different actors have thus been brought together to form an 'innovation ecosystem'. The ultimate goal is to increase the contribution of science and innovation to societal wellbeing and economic growth. However, there are some concerns about the extent to which the collaboration aspired to by the combined approach to science and innovation is actually achieved in practice, and how well the coordination works.

## 2 SYSTEM OF FUNDING: COMPETITION, EXCELLENCE AND IMPACT

The British system of science funding is strongly based on competition between universities on the basis of excellence and impact. Budgets for research and education are separate. Thus, budgets received for research are not connected to the amount of education a university provides (as in the Netherlands). University education is mainly financed from tuition fees (students can make use of an income-contingent loan system).

Public funding of research has two main components: direct funding (by Higher Education Funding Councils - HEFCE) and indirect funding (by Research Councils). The two types of expenditure have around equal amounts of money to distribute. Whereas in the Netherlands, direct funding amounts to eight times the amount of indirect funding. Indirect funding is provided by seven research councils and is granted to individual researchers and research groups. Money from direct funding is granted for a number of years by the HEFCE to each of the four regions (England, Scotland, Wales, North-Ireland). The distribution key for these funds is determined by an appraisal of past results within the Research Evaluation Framework (REF). Thus, the competition for funds takes place after the fact, ex post. Money from indirect funding budgets is distributed by seven research councils and based on peer reviews of research propositions. This is comparable to the way the Dutch organization (NWO) distributes funds. Thus, competition for these funds happens ex ante, on the basis of plans

## 3 ASSESSMENT OF SCIENCE ON THE BASIS OF EXCELLENCE AND IMPACT

The UK pays much attention to the impact of research, both to the actual impact (a factor in direct public funding) as to predictions on future impact (a factor in indirect public funding). There is an extensive procedure to appraise the results of research. Faculties are asked to select the four best research products per researcher in a certain recent funding period. Thus, the evaluation is not of individual researchers, but of faculties. It does

not involved all researchers, nor their complete production. Faculties can choose how many and which researchers they put forward for a certain period. The procedure lasts a year and is intensive: 36 assessment units, 1.000 assessors, 50.000 research papers to be assessed and 250 panel meetings. The results of a faculty are not only appraised for scientific quality, but also for their practical impact, going back to a maximum of 15 years. A consequence of the system is that the pressure to publish high quantities of work is replaced by a pressure to publish results which have an impact.

#### 4 HIGHER EDUCATION: LANDSCAPE OF TOP- AND LOWER RANKING UNIVERSITIES

The educational system of the UK is characterized by strong competition between universities for funds and for the best students and scientists. This is partly a consequence of the system of funding whereby the bulk of public funding goes to a few top institutes: the ten best universities take in 40% of the total public budget for research. This enables top universities to do even better by attracting to scientists and teachers, and offering high quality education (for example through low student-teacher-student ratio, small groups and much personal attention). Thus, the mechanisms of funding supports a historically grown landscape consisting of a few top-ranking universities (Oxford en Cambridge), some high-ranking institutes just under the world-top (University College London, Imperial College, Manchester University, and a few others) and a great number of lower-ranking and sometime mediocre universities, within which there are faculties here and there with above-average or excellent results. As a consequence, there are large differences between the universities, both in expenditure per student (resulting in quality differences) and in career opportunities for graduates.

Thus, the UK has several top-ranking universities of world-class strength and reputation. Oxford en Cambridge are in the top 5 worldwide, five other universities are in the top 50. In comparison: TU Delft and Leiden University are the highest Dutch university in these rankings and take a place in the top 70 worldwide. The top-ranking UK universities attract and pull in the best students and scientists in the world. At the same time, the existence and strong public funding of the top universities leads to side effects in the area of the accessibility of high quality higher education for all. The top institutes select the best students and research shows than to be generally less accessible for students from disadvantaged backgrounds.

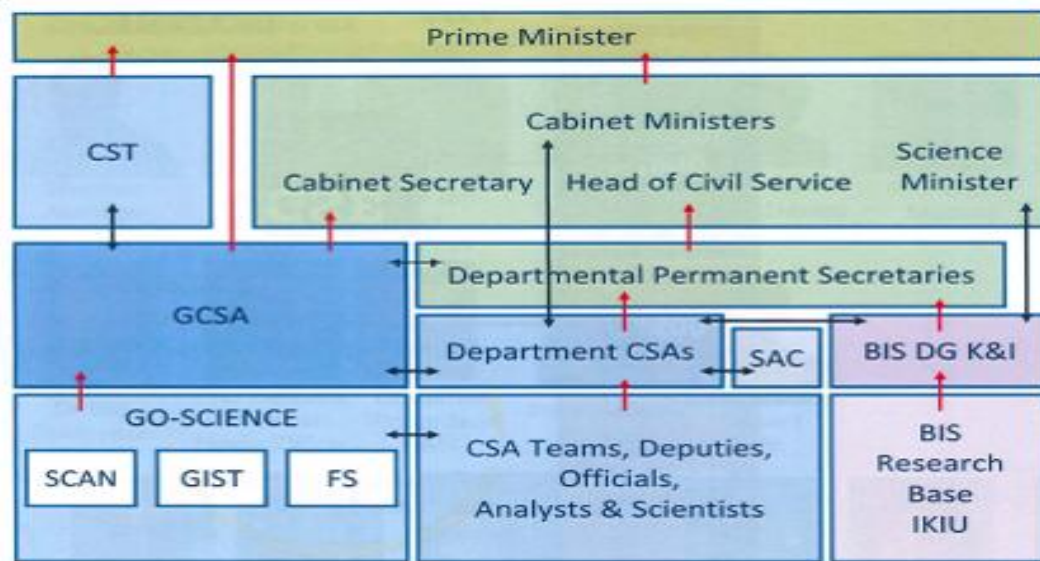
This is strengthened by the system of secondary education in which there are large differences between *state* and *public schools*. Thus, students from privileged backgrounds have a seven times higher chance of being selected by a top university than the least-privileged students, who then must rely on institutes with less funding and, in some cases, lower quality and lesser career opportunities. Accessibility is also determined by financial factors: since 2010 universities decide their own tuition fees. Universities as Oxford en Cambridge ask for the maximum amount of £9.000 (€ 11.000) a year. An important question for the Netherlands: It is desirable and possible to develop and fund top-ranking institutes without creating the side effects on the accessibility of higher education in general?

#### 5 SCIENCE FOR POLICY APPROACH; CHIEF SCIENTIFIC ADVISERS

The British government has a well-thought-out and extensive *Science Advisory Structure*, which has remained stable over the years and aims to ensure science and relevant scientific results are part of the process of policymaking. The structure takes on the form of a pyramid (see figure 1). At the top, there is a Government Chief Scientific Adviser (GCSA), supported by an organization and staff (GO-Science). Then, there is a network of around 20 Department Chief Scientific Advisers, each supported by their own staff. Not in figure 1, but also of importance to this approach is the Government Science & Engineering (GSE), a professional cadre of around 3500 scientists who work in 30 different government organisations. This network strives to increase recognition

of the profession's contribution to policy as well as build a community with links between the different analytical streams and policy makers.

Figure 1: Structure of policy for science approach



Generally speaking, the scientists in the structure are from disciplines in the natural and the technical sciences. This gives the system a somewhat different character than the Dutch one of planning offices and advisory councils in which there are many members with a background in social sciences and the humanities. This system is thought to enable the British government to take important steps towards a system of science-informed and evidence-based policy. However, as in the Netherlands, the government is not obliged to follow-up advice given by the scientists and organizations in the structure, nor to offer reasons for following an alternative course. As a result, the impact of chief scientific advisors varies per person.

## 6 ENTREPRENEURIAL CLIMATE

International rankings -and interviewees from the business sector who have experience in both countries- suggest that the British business and entrepreneurial climate may be more attractive to innovative companies than the Dutch one. In international rankings the UK scores much higher than the Netherlands in market and business 'sophistication' and, 'ease of doing business'. In the UK it is easier to start a business, obtain the necessary permission (of ownership, building permits etc) and obtain loans than in the Netherlands.

Another relevant element in this context is the *Technology Strategy Board (TSB)*. This board is responsible for the execution of the British innovation policy, but is organized differently than the corresponding Dutch organization (Agentschap NL). The TBS operates at more of a distance from the government (a quasi-autonomous non-governmental organization or 'quango'). The people who work there mostly have a background in business, not in civil service. The TSB distributes public funding but is also an important advisor and network partner to innovative companies (e.g. through the Knowledge Transfer Networks). Also, the TSB has facilities for development work (developing and testing new technologies) such as the catapult centres.

## FINAL REMARKS

The United Kingdom and the Netherlands score comparably on international innovation rankings. However, the UK-approach to science and innovation differs strongly from the Dutch approach. Thus, both countries are successful but have different mixtures of inputs and structures. The differences are due to a number of highly interconnected factors: different cultural, historical, social and economic development which in turn lead to differences in the structure of institutions and general approach to science and innovation. Systems develop organically over time and data are not always available and notoriously hard to compare. Thus, it is almost impossible to conclude that the UK-approach could be applied successfully to the Netherland and whether this would be a better option than the current system. Nor is it possible to draw direct inferences for Dutch policy from this study. Whilst the AWT-report therefore, has identified issues for debate, we have avoided making specific recommendations. However, the UK approach can and should act as 'food for thought' for policy makers in the Netherlands, aiming to make the Dutch system even more successful than it is at present.