



ERAWATCH Country Report 2009

Analysis of policy mixes to foster R&D investment
and to contribute to the ERA

The Netherlands

Jasper Deuten



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Contact information

Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 954488318
Fax: +34 954488300

IPTS website: <http://ipts.jrc.ec.europa.eu>
JRC website: <http://www.jrc.ec.europa.eu>
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ERAWATCH COUNTRY REPORT 2009: The Netherlands

**Analysis of policy mixes to foster R&D
investment and to contribute to the ERA**

ERAWATCH Network – Technopolis Group, The Netherlands

Jasper Deuten

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Executive Summary

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are thus at the heart of the Lisbon Strategy. This is reflected in guideline No. 7 of the Integrated Guidelines for Growth and Jobs. This advocates increasing and improving investment in research and development (R&D), with a particular focus on the private sector. This report aims at supporting the mutual learning process and the monitoring of Member States efforts. Its main objective is to characterise and assess the evolution of the national policy mixes in the perspective of the Lisbon goals, with a particular focus on the national R&D investments targets and on the realisation and better governance of the European Research Area. The report builds on the analytical country reports 2008 and on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

The Netherlands has relatively high labour productivity, a well-educated workforce and a good reputation in the sciences. However, the R&D investments in the Netherlands are still far removed from the target of 3% of GDP. GERD dropped from 1.78% of GDP in 2004 to 1.70% in 2007 (EU27=1.83%). Especially the business expenditures on R&D remain stagnant at ca. 1% of GDP, which is a long way from the official target of 2%. R&D expenditures by the government sector and the higher education sector show a declining trend. It is unlikely that the government will be able to increase the share of its budget appropriations or outlays for R&D substantially in the coming years, especially in view of the current economic recession. Also because of the economic recession, R&D investments by the private sector cannot be expected to increase substantially in the near future.

The national growth strategy is based upon the notion that the Dutch economy must have an attractive business and investment climate in which businesses have the space and the capacities to undertake economic activities and create added value and employment. Here, knowledge and innovation are important.¹ Since 2005 Dutch policy aims to strengthen the innovation climate, by creating a healthy and challenging business climate, a stable macroeconomic environment, clear legislation and regulations, a favourable tax climate and by ensuring the availability of sufficient qualified personnel (human capital). A second main aim is to increase the number of innovating companies with a “basic package” of financial and non-financial instruments. A third aim is to create “focus and mass” in strategic areas of innovation. In the cabinet’s policy programme for 2007-2011, the aim is to create an innovative, competitive and enterprising economy in a sustainable living environment. Elements Key elements remain ensuring a sufficient supply of qualified personnel, increasing innovation and dynamic development, and maintaining sufficient attention for sustainability.

¹ National Reform Programme for the Netherlands 2005-2008, p. 21.

The policy mix for increasing national R&D investments consists of 6 Routes.

1. promoting the establishment of new indigenous R&D performing firms;
2. stimulating greater R&D investment in R&D performing firms;
3. stimulating firms that do not perform R&D yet to perform R&D;
4. attracting R&D-performing firms from abroad;
5. increasing extramural R&D carried out in cooperation with the public sector or other firms;
6. increasing R&D in the public sector.

In the Dutch policy mix, Route 6 is the most important, also in budgetary weight (e.g. a large block grant to the universities). Route 2 is also very important. The fiscal scheme WBSO, for example, is the largest R&D policy measure for the private sector. Route 5 has become much more important since the 1990s, with, for example, large R&D investments from the FES fund (with revenues from natural gas exploitation). Route 4 is increasingly recognised as an important route, but R&D performing firms are mainly attracted indirectly, via the other routes. Route 1 is important, but relatively small in terms of budgetary weight. Route 3 receives the least emphasis in the Dutch policy mix.

Main barriers to – in particular private – R&D investment are listed in the table below.

| Barriers to R&D investment | Opportunities and Risks generated by the policy mix |
|---|---|
| Sector structure with low R&D intensity | More R&D intensive firms, also from abroad, are needed. |
| SMEs not sufficiently innovative | The “basic package” in the policy mix is more focused on stimulating greater R&D investment in R&D performing firms than of stimulating firms that do not perform R&D yet to perform R&D. |
| Attractiveness of the Netherlands for foreign knowledge workers and R&D intensive firms | Policy has recognised this barrier, but more could be done (also in terms of raising knowledge investments, e.g. in research infrastructure) |
| Looming shortage of graduates in S&T | The Delta Plan S&T has started to have good effects. |
| Learning culture not ambitious enough | The new Strategic Agenda for Higher Education, Research and Science Policy has identified the improvement of the learning culture as a major aim. Various measures have been developed. |
| Low degree of interaction between universities and SMEs | The Innovation Voucher scheme is a first step towards increasing interaction between universities and SMEs. |
| Governance structures too complex and fragmented | An interdepartmental “Knowledge & Innovation” programme department has been set up and an long-term strategy for knowledge investments has been developed, but a more thorough policy streamlining and a more integral approach of the knowledge triangle would be helpful. |

A structural reason for insufficient progress towards the R&D investment targets is the relatively large share of the services sector in the Dutch sector structure. Not only is the services sector not as R&D intensive as the (high-tech) industry sector, but R&D in the services sector is not captured adequately with current measurement methods. Indeed, it could be doubted if it would be wise to strive for the 2% too rigorously and too quickly. Another main factor is that the Netherlands is not sufficiently attractive for foreign companies to perform R&D. Policy should probably focus more on improving the attractiveness of the Netherlands for R&D-intensive companies by having enough knowledge workers, world-class knowledge institutions

and research facilities and a dynamism which encourages innovation. Efforts from both the public and public parties are needed. Extra (structural) investments in knowledge will be necessary. In the longer term, this would also change the Netherlands' sector structure.

While there are no major gaps in the portfolio of instruments used to increase R&D investments, more attention could be paid to Route 3 (Stimulating firms that do not perform R&D yet to perform R&D), Route 4 (Attracting R&D performing firms from abroad) and Route 6 (Increasing R&D in the public sector). To achieve national R&D investment goals, more R&D intensive firms, also from abroad, are needed. The "basic package" in the policy mix could focus more on stimulating firms that do not perform R&D yet to perform R&D. To further increase the attractiveness of the Netherlands as a location for R&D, additional efforts will remain necessary (also in terms of raising knowledge investments, e.g. in research infrastructure). There is evidence that the policy mix increasingly succeeds in raising the numbers of graduates in S&T, thus avoiding a shortage of HRST. With regard to improvement of the governance structures, an interdepartmental "Knowledge & Innovation" programme department has been set up and an long-term strategy for knowledge investments has been developed. However, a more thorough policy streamlining and a more integral approach of the knowledge triangle would be helpful.

Importance of ERA and ERA-related policies in the overall national research policies and strategies

The European Research Area (ERA) does not play a pivotal role in Dutch research policies and strategies. Internationalisation is an important element, but this is not restricted to Europe or ERA. "Quality" is the leading notion in internationalisation policies: high quality (or research, education, facilities, etc.) is required to be competitive in international settings and to attract talented students, researchers and knowledge workers); and internationalisation contributes to raising the quality of higher education, research and science.

Dutch national policy does aim to increase mobility of researchers ("brain circulation") and to improve career perspectives of researchers. The policy rationale is not explicitly linked to ERA, however, but rather to strengthening the Dutch education/research/innovation system in an international context. The inward mobility of knowledge workers has been made easier, but further reduction of mobility barriers remains a challenge.

It is increasingly recognised in Dutch research policy that excellent research facilities are crucially important for the quality and international competitiveness of the Dutch research system. After a slow start, a Netherlands' roadmap for large-scale facilities was developed in the context of the ESFRI roadmap. The European dimension in policies and strategies on research facilities is not very strong (yet).

Universities have a large degree of autonomy, also with respect to ERA-related issues. The development of stronger international profiles remains a challenge for Dutch (research) universities.

While most of the competitive research funding is for researchers affiliated with a Dutch university/research institute, a small but increasing number of subsidies and research programmes aimed at talented scientists are open for applications by researchers affiliated with universities/institutes from abroad (not limited to EU). The Netherlands participates actively in various ERA-NETs, JTIs, ETPs and other EU programmes.

In addition, internationalisation is also an increasingly important dimension in the innovation programmes in the key areas. These programmes have to result in international 'hot spots' that contribute to the attractiveness of the Netherlands for researchers, knowledge workers and R&D intensive companies. Again, the policy focus is on internationalisation rather than Europeanisation or ERA.

| | Short assessment of its importance in the ERA policy mix | Key characteristics of policies |
|--|--|---|
| Labour market for researchers | <ul style="list-style-type: none"> • Important, especially with regard to removing barriers to mobility | <ul style="list-style-type: none"> • The guiding principle is "quality" of education and research, because internationalisation requires quality and internationalisation enhances quality. • Policy focus on mobility of Dutch students; international orientation of knowledge institutes; "brain circulation"; and an ambitious learning culture and an excellent research climate. • Member States have responsibility for removing barriers for knowledge workers A EU mobility strategy should support this process • Better career prospects for young researchers, women and ethnic minorities via policy-rich dialogue with (autonomous) research institutions and via various instruments. • Various grants that stimulate international mobility. • Active contribution to the ERA-MORE mobility portal. |
| Governance of research infrastructures | <ul style="list-style-type: none"> • Increasingly important; the ESFRI roadmap has prompted the Netherlands to develop a national roadmap | <ul style="list-style-type: none"> • Development of national roadmap. • Recognition of importance of research infrastructures for the research climate in the Netherlands • Investment impulses from the FES, no structural funding. • Opportunities for facility sharing with neighbouring regions are being explored • Active international participation in CERN, EMBL, EMBC, ITER, ESO and ESA |
| Autonomy of research institutions | <ul style="list-style-type: none"> • Universities already have a large degree of autonomy since the mid-1990s. Autonomy is considered crucial in Dutch research policy. | <ul style="list-style-type: none"> • Universities have large degree of autonomy. Policy aims to give universities more freedom in order for them to work on their own (international) profiling. • Autonomy is accompanied by legislative obligations, such as maintaining a system of quality assurance, obligations towards students and accountability towards the government and society. • Transfer of €100m/yr from block grant to competitive funding of talented researchers as a policy effort to increase the dynamics in the research system |

| | Short assessment of its importance in the ERA policy mix | Key characteristics of policies |
|--|---|---|
| Opening up of national research programmes | <ul style="list-style-type: none"> • Increasingly important, but progress so far is limited. | <ul style="list-style-type: none"> • Dutch government is in favour of more coordination between national research programmes and the mutual opening up of national research programmes. • An increasing (but still limited) number of research instruments are open for researchers affiliated to foreign research institutes. • NWO has signed the Money Follows Researcher initiative. • The Netherlands participates actively in ERA-NET projects. • Dutch parties are also actively involved in several JTIs and ETPs. • The innovation programmes in key areas of the Dutch economy increasingly get an international dimension. The goal is to become international 'hotspots' through international collaboration. • Opportunities for more cross-border collaborations and mutual opening up of programmes are being explored. |

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1 Introduction

As highlighted by the Lisbon Strategy, knowledge accumulated through investment in R&D, innovation and education is a key driver of long-term growth. Research-related policies aimed at increasing investment in knowledge and strengthening the innovation capacity of the EU economy are thus at the heart of the Lisbon Strategy. This is reflected in guideline No. 7 of the Integrated Guidelines for Growth and Jobs.² This advocates increasing and improving investment in research and development (R&D), with a particular focus on the private sector. For the period 2008 to 2010, this focus is confirmed as main policy challenge and the need for more rapid progress towards establishing the European Research Area, including meeting the collective EU target of raising research investment to 3% of GDP, is emphasised.

A central task of ERAWATCH is the production of analytical country reports to support the mutual learning process and the monitoring of Member States' efforts in the context of the Lisbon Strategy and the ambition to develop the European Research Area (ERA). The first series of these reports was produced in 2008 and focused on characterising and assessing the performance of national research systems and related policies in a comparable manner. In order to do so, the system analysis focused on key processes relevant for system performance. Four policy-relevant domains of the research system have been distinguished, namely resource mobilisation, knowledge demand, knowledge production and knowledge circulation. The analysis within each domain has been guided by a set of generic "challenges", common to all research systems, which reflect possible bottlenecks, system failures and market failures which a research system has to cope with. The analysis of the ERA dimension still remained exploratory.

The country reports 2009 build and extend on this analysis by focusing on policy mixes. Research policies can be a lever for economic growth, if they are tailored to the needs of a knowledge-based economy suited to the country and appropriately coordinated with other knowledge triangle policies. The policy focus is threefold:

- An updated analysis and assessment of recent research policies
- An analysis and assessment of the evolution of national policy mixes towards Lisbon R&D investment goals. Particular attention is paid to policies fostering private R&D and addressing its barriers.
- An analysis and assessment of the contribution of national policies to the realisation of the ERA. Beyond contributing to national policy goals, which remains an important policy context, ERA-related policies can contribute to a better European level performance by fostering, in various ways, efficient resource allocation in Europe.

² COM(2007) 803 final, "INTEGRATED GUIDELINES FOR GROWTH AND JOBS (2008-2010)", http://ec.europa.eu/growthandjobs/pdf/european-dimension-200712-annual-progress-report/200712-annual-report-integrated-guidelines_en.pdf

2 Characteristics of the national research system and assessment of recent policy changes

2.1 Structure of the national research system and its governance

The Netherlands is a prosperous, densely populated country with over 16 million inhabitants, which amounts to 3.3% of the total EU27 population. The share of the Netherlands in the total GDP of the EU27 is 4.6% (2007). The share of the Netherlands in the total R&D expenditures (GERD) of the EU27 is 4.3%. The Dutch knowledge economy is, in economic terms, among the better performing countries in the world. According to the [European Innovation Scoreboard 2008](#), the Netherlands is an “innovation follower”, with scores below those of the innovation leaders but equal to or above that of the EU27. Within this group, the Netherlands is, however, a “slow grower”. The expenditures on R&D in terms of GERD as % of GDP amount to 1.70% (2007) which is relatively low compared to EU27 average (1.83%). Moreover, the R&D intensity is declining, rather than growing (it was 1.78% in 2004). Especially the R&D intensity of the business sector is relatively low (1.03% in 2007, while EU27=1.17%). R&D intensity of the government sector is also below EU27 average (0.22% in 2007, EU27=0.24%). On the positive side, the R&D intensity of the higher education sector is relatively high with 0.45% in 2007 (EU27=0.41%). With regard to the funding sources of R&D, the Netherlands is characterised by a relatively low share of the business sector (51%) and relatively high shares of the government sector (36%) and abroad (11%).

Main actors and institutions in research governance

Main actors and institutions in **research governance** include the [ministry of Education, Culture and Science](#) (OCW) and the [ministry of Economic Affairs](#) (EZ). Historically, a strong division of labour has existed between science and basic research (*i.e.* OCW) on the one hand, and technology and innovation (*i.e.* EZ) on the other, both in terms of policy design, funding and research performers. As a result, two different governance cultures in the science and innovation parts of the system have emerged. While EZ’s approach can be characterised as “hands on” with an active role in policy design, programme design and programme management, OCW’s approach is rather “hands off”, delegating more responsibilities to the [national research council NWO](#) and the various organisations in the science and research system. However, at different levels in the system these two spheres are gradually moving towards each other. The latest sign of this is the new interdepartmental [“Knowledge & Innovation” programme department](#) (K&I).³ Besides OCW and EZ, other ministries are also involved in R&D. They focus, however, not on generic policy, but on R&D and innovation within their specific policy domains. Since 2006, each ministry has a “knowledge chamber” to organise “policy for knowledge” (e.g.

³ The interdepartmental “Knowledge & Innovation” programme department (K&I) was established in 2007 to increase coherence in policies on knowledge, innovation and entrepreneurship. K&I implements one of the ten projects of the cabinet’s policy programme 2007-2011, “Netherlands Entrepreneurial Innovation Country”. More specifically, K&I links societal challenges (e.g. in health care, energy, education, safety&security, water) to economic opportunities. For more information see www.kennis-innovation.nl.

foresight) and “knowledge for policy”. The budgets of these ministries for R&D are much lower than those of OCW and, to a lesser extent, EZ.

Decisions on R&D policy to be taken by the plenary Cabinet are prepared by one of the sub-councils of the Council of Ministers: the Council for Economy, Knowledge and Innovation (REKI). The agenda and the foreseen decisions are coordinated and prepared by the Committee on Economy, Knowledge and Innovation (CEKI), which consists of high-level civil servants of all ministries involved.

The [Innovation Platform](#) (IP) is a high-level coordination and strategy-setting mechanism in the Dutch governance structure. The IP was installed (by Royal Decree) and is headed by the Prime Minister. In its second four-year period (2007-2011) it primarily focuses on R&D and innovation in societal fields such as health care, education, energy and water management. It works with the K&I programme department on these issues.

Advisory bodies in research governance include the [Advisory Council for Science and Technology Policy](#) (AWT) and the [Royal Netherlands Academy of Arts and Sciences](#) (KNAW).

R&D policy is implemented (mainly) by two key agencies: the research council NWO and the innovation agency SenterNovem. The [Netherlands Organisation for Scientific Research NWO](#) is an independent administrative body and functions as a funding agency of the ministry of OCW. NWO is responsible for enhancing the quality and innovative nature of scientific research in all fields, and for initiating and stimulating new developments in scientific research. NWO mainly does this by allocating resources, especially to university research.⁴ [SenterNovem](#) is an agency of EZ which implements R&D and innovation schemes mainly for EZ (half the turnover) and other ministries. A third organisation in research policy implementation is the [Technology Foundation STW](#), which operates as an independent part of NWO. STW supports and finances scientific-technological research projects and promotes utilisation of results of research by third parties. EZ and NWO are main financiers of STW.

Given the relatively small size of the Netherlands, the **regions** only play a minor role in research governance. Regional innovation policies at the national level have increasingly become aligned with national priorities.

Main **research performers** in the public knowledge infrastructure are the 14 Dutch universities, the 19 research institutes of the Royal Academy KNAW, the nine research institutes of the research council NWO, the research institutes of the Wageningen University and Research Centre⁵, TNO (Netherlands Organisation for Applied Research), the four Large Technological Institutes⁶, various Leading Technology Institutes (TTIs)⁷, and several state-owned research and expertise centres.

⁴ NWO also administers nine research institutes in the fields of physics, mathematics and computer science, astronomy and space research, marine research, history and penal science.

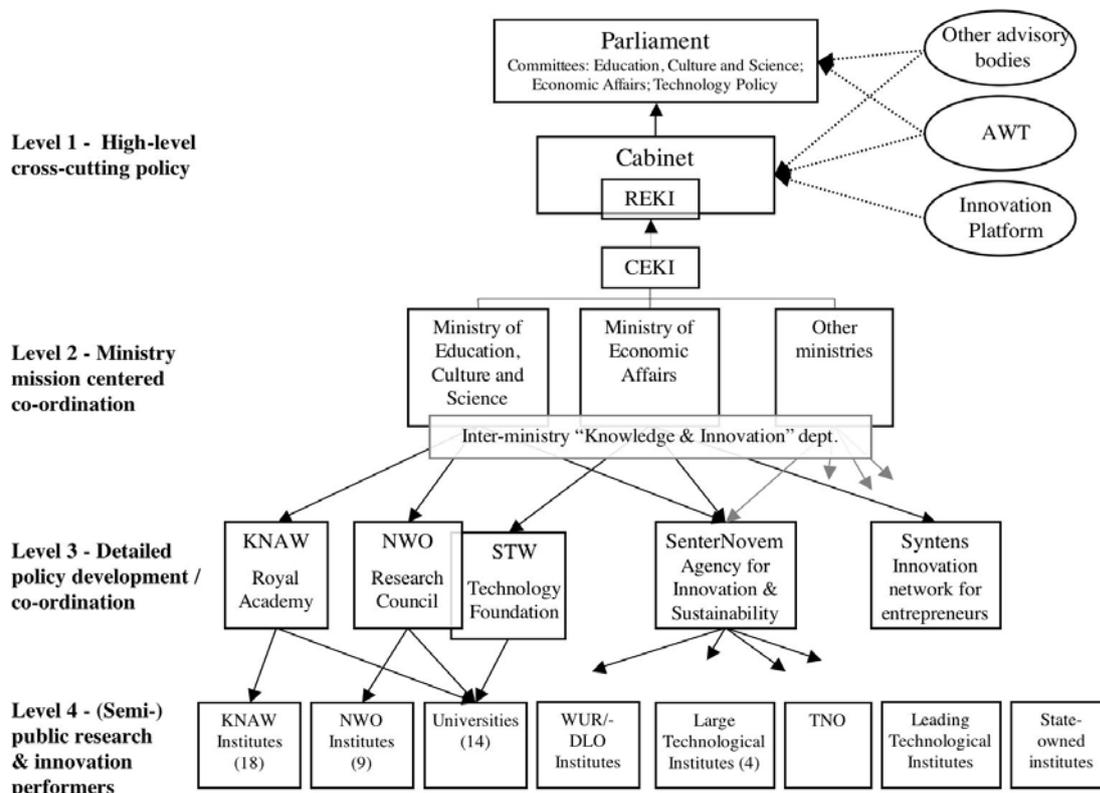
⁵ The specialised research institutes are active in agro technology & food sciences, animal sciences, environmental sciences, plant sciences and social sciences.

⁶ The LTIs are active in aerospace (NLR), energy (ECN), water management and hydraulic engineering (Deltares) and maritime research (MARIN).

⁷ The TTIs (“technological top institutes”) are – often virtual – research organisations in which companies, universities and research institutes participate in public-private partnerships for research and innovation. In 2008 such “top institutes” are active in ICT, polymers, materials, food, pharmaceuticals, molecular medicine, life sciences and water. (See <http://www.senternovem.nl/tti/> for more information).

By far the most important private research performers are eight large R&D intensive companies (Philips, ASML, AkzoNobel, NXP, Shell, DSM, Océ and Unilever). Together they are responsible for almost 75% of the business expenditures on R&D. Philips, for instance, is responsible for roughly 20% of total BERD in the Netherlands.

Figure 1: Overview of the governance structure of the Dutch research system



Source: [ERAWATCH Research Inventory](#)

2.2 Summary of strengths and weaknesses of the research system

The analysis in this section is based on the ERAWATCH Analytical Country Reports 2008 which characterised and assessed the performance of the national research systems. In order to do so, the system analysis focused on key processes relevant for system performance. Four policy-relevant domains of the research system have been distinguished, namely resource mobilisation, knowledge demand, knowledge production and knowledge circulation. The analysis within each domain has been guided by a set of generic "challenges", common to all research systems, which reflect possible bottlenecks, system failures and market failures a research system has to cope with. The Analytical Country Report for the specific country can be found in the [ERAWATCH web site](#).

The strengths and weaknesses of the Dutch research system and governance can be summarised as follows:

Table 1: Summary assessment of strengths and weaknesses of the national research system

| Domain | Challenge | Assessment of strengths and weaknesses |
|-----------------------|---|---|
| Resource mobilisation | Justifying resource provision for research activities | Strengths exist in a high level of awareness on the need to invest (more) in R&D. However, this has not (yet) translated in increased GERD. |
| | Securing long term investment in research | No specific strengths or weaknesses |
| | Dealing with barriers to private R&D investment | Relatively low BERD remains a serious weakness. The presence of a few large multinational R&D intensive companies is a strength, but the Dutch sector structure is not very R&D intensive with many SMEs that do not perform R&D. |
| | Providing qualified human resources | Strengths exist in an overall good quality of higher education. Weaknesses exist in looming shortages in HRST, a learning culture and a research culture that are insufficiently ambitious or excellent, also to attract talented students, excellent researchers and R&D intensive firms from abroad. |
| Knowledge demand | Identifying the drivers of knowledge demand | Dutch research system has strengths in identifying knowledge demands in "key areas" in an interactive, bottom-up fashion. "Relevance" (next to "excellence") is a key objective of many R&D instruments. A relatively large part of public R&D funding goes via general university funds, leaving it to the universities to identify and address knowledge demands. |
| | Co-ordination and channelling knowledge demands | Co-ordination between priority setting by different governmental actors and across different policy measures is a weakness. |
| | Monitoring of demand fulfilment | Evaluation is structural part of policy processes. |
| Knowledge production | Ensuring quality and excellence of knowledge production | Dutch research system has high scientific publication output, especially in Nature and Health related disciplines. Dutch research system has high scientific productivity. Dutch research system has high citation impact scores, especially in Nature, Health, Agriculture, Technology and Behaviour and Society related disciplines. |
| | Ensuring exploitability of knowledge | Many mechanisms exist to match scientific knowledge production to economic and societal needs. The Dutch research system is highly complex with many different policy instruments, institutes and centres (fragmentation). |
| Knowledge circulation | Facilitating circulation between university, PRO and business sectors | A broad range of instruments exists to support knowledge circulation and cross-sector collaboration. Emerging professionalisation of knowledge valorisation in universities. |
| | Profiting from international knowledge | Good participation of Dutch partners in international programmes and research institutes. Relatively low level of R&D performed by foreign firms. The attractiveness of the Netherlands for international students and talented knowledge workers could be better. |
| | Enhancing absorptive capacity of knowledge users | Shortage of students and knowledge workers in S&T. |

The Netherlands has strengths in justifying resources provision for research activities. However, although there appears to be a broad consensus on the need to invest more in R&D, actual investments need to be increased substantially. Especially BERD is relatively low, partly due to the Dutch sector structure. The challenge of providing qualified human resources (especially in science and engineering) is met increasingly better. However, there is need for a more ambitious learning culture and an excellent research climate with more opportunities for talented students and knowledge workers – also from abroad.⁸

Since the mid 1990s, many efforts have been undertaken to make the Dutch research more responsive to knowledge demands. The downside of all these efforts is that the level of co-ordination has not been as good as it should have been, which led to lack of cohesion and a multitude of initiatives. Recently, the policy pendulum seems to be changing direction again, focussing more on pure and independent scientific research with less consideration for “relevance” and immediate knowledge demands from outside the scientific world. The fact that Dutch universities get a relatively large share of their income via lump sum financing (block grant) can be both a strength and a weakness, depending on whether universities further develop their strategic capabilities to identify and address knowledge demands.

The Dutch research system has strengths in scientific knowledge production. As a response to a recognised need to make the public knowledge more responsive to demands from society and the economy, various mechanisms have been put in place to stimulate “relevance”. This has resulted in a rather complex research system with complex funding flows.

Cross-sector circulation is relatively strong in specific sectors where large R&D intensive companies are present. In other sectors, public-private circulation could be better. However, there is a broad range of instruments and mechanisms to address this issue. Access to international knowledge also is a strength of the Dutch research system, which is illustrated by good participation in international programmes. There are, however, also some weaknesses, such as the looming shortages of students and knowledge workers in S&T and the relatively low attractiveness for foreign students/researchers⁹ and foreign R&D intensive firms¹⁰. Finally, universities could further improve their “valorisation” strategies and approaches.

2.3 Analysis of recent policy changes since 2008

The contribution of research and research policies to Lisbon goals (as well as to other societal objectives) goes beyond the fostering of R&D investment. It is therefore important to also analyse how other remaining shortcomings or weaknesses of the research system are addressed by the research policy mix. The focus of the section is on the analysis of main recent policy changes which may have a relevant impact on the four policy-related domains.

⁸ It should be noted that the Dutch research system in general is competitive compared to other countries in the EU. In terms of world-class top-level performance, however, the Dutch research system is not as good as it could be.

⁹ ‘Brain drain’ (Dutch researchers going abroad) appears to exceed ‘brain gain’ (foreign researchers coming to the Netherlands) according to OECD data. (OECD, Database on immigrants and expatriates, 2005
http://www.oecd.org/document/35/0,2340,en_2825_494553_34063091_1_1_1_1,00.html)

¹⁰ Funding from abroad for R&D performed in the Netherlands is above EU27 average, but the amount of R&D performed by foreign firms in the Netherlands is relatively low.

2.3.1 Resource mobilisation

In 2008, the interdepartmental “Knowledge & Innovation” programme department (K&I), which is responsible for the implementation the project “[Netherlands Entrepreneurial Innovation Country](#)” (NOI)¹¹, published the long term strategy [Towards an agenda for sustainable productivity growth](#). The long term strategy is based on the [Knowledge investment agenda](#) of the Innovation Platform (IP) and the advisory report [The Netherlands in the World](#).¹² The starting point of the strategy is the connection of societal and economic challenges. Several scenarios orient the government in its ambitions, which can only be achieved through “sustainable productivity growth”. The strategy focuses on three central factors: (1) to strengthen and utilise **talents**; 2) to strengthen and utilise knowledge in public and private **research**; and (3) to promote innovative **entrepreneurship**. These three factors are elaborated in concrete goals, agendas and measures.

In 2008 the “[societal innovation agendas](#)” for health, water and safety were developed by K&I and the IP. As part of these agendas, the government has provided €90m for the coming years. In 2009, new programmes will be launched for health care, energy, water, education and safety.

The current cabinet will use funds (up to €500m) from the FES (Economic Structure Enhancement Funds)¹³ to continue successful large consortia-based R&D and innovation projects in the period 2009–2014. The cabinet will also start preparing an investment agenda for research and innovation for the next cabinet period.¹⁴

In the period 2007-2011 the R&D (Promotion) Act [WBSO](#) – one of the major (fiscal) instruments in the policy mix – is intensified with an additional €39m to €115m (total budget in 2011 amounts to €542m/year). Furthermore, the [Innovation Vouchers](#) scheme is also expanded. Its budget may increase from €30m to €42m/year. The [Innovation Credit](#) scheme was introduced in 2008. In 2008-2011 the “key area” approach is expanded with three additional innovation programmes in 2008.

In order to increase R&D investments, the [Netherlands Foreign Investment Agency](#) (NFIA) will focus more explicitly on attracting foreign R&D investments.

In the [Strategic Agenda for Higher Education and Research and Science Policy](#) (2007-2011) it was announced that the cabinet sees investing in top talent as the way to stimulate pioneering research and to ensure that Dutch science can operate as the international frontline of science. The [Innovational Research Incentives scheme](#) is intensified, the development of graduate schools “American style” is stimulated, instruments specifically aimed at women and ethnic minorities are continued. A new element is the introduction of Academy assistants. In 2009 pilots will be set up with the aim to offer talented and motivated students the opportunity to work in a challenging learning environment of excellent researchers.

¹¹ NOI one of the ten projects of the cabinet’s policy programme 2007-2011.

¹² IP, 2006, Kennisinvesteringsagenda. IP, 2008, Nederland in de wereld: Connecting global ambitions. IP, 2008, Nederland in de Wereld: Versterken van de concurrentiekracht voor de toekomst van Nederland (working document).

¹³ The FES is fed with revenues from natural gas exploitation.

¹⁴ As part of the package of measures to tackle the economic recession, the cabinet has made available additional funds from FES for continuation of existing (and fast execution of new) innovation programmes. For the year 2009-2010, €280m is allocated for temporary occupation of knowledge workers in (semi-)public knowledge institutes, €110m for prolonging innovation programmes that will terminate (and €390m for 2011 and beyond) and €218m for fast execution of innovation projects (funded from FES). Source: [Supplementary Policy Agreement](#), March 25, 2009.

Changes in National Reform Programme regarding the role of research in the broader economic growth strategy

The current coalition government Balkenende IV (2007-2011) set out its policy plans in the policy programme entitled “[Working together, living together](#)”. These policy plans were outlined in the 2007 Progress Report on the Dutch National Reform Programme. Since that time, the cabinet has worked to implement and develop these plans. The [2008 Progress Report](#) describes how the cabinet deals with the implementation and development of the policy plans. In particular, it examines the actions taken in response to the recommendation and points requiring attention adopted by the EU Spring Council.

Table 2: Main policy changes in the resource mobilisation domain

| Challenges | Main Policy Changes |
|---|---|
| Justifying resource provision for research activities | <ul style="list-style-type: none"> • Long term strategy, based on the Knowledge Investment Agenda (KIA) of the Innovation Platform |
| Securing long term investments in research | <ul style="list-style-type: none"> • No major changes since 2008 |
| Dealing with uncertain returns and other barriers | <ul style="list-style-type: none"> • Intensification of WBSO and Innovation Vouchers scheme |
| Providing qualified human resources | <ul style="list-style-type: none"> • Pilot with Academy assistants |

2.3.2 Knowledge demand

Since 2008, no major policy changes have occurred. As part of the programmatic approach for “key areas”, three new innovation programmes were launched, which were developed in close interaction with stakeholders. As part of the programmatic approach for “societal themes”, four societal innovation agendas were developed, as a step towards societal innovation programmes. Also other processes to identify the drivers of knowledge demand were continued, for example the programmatic funding of the research institutes [TNO](#) and the Large Technological Institutes. With regard to the coordination and channelling of knowledge demands, worth mentioning is that the [Netherlands Genomics Initiative](#) (NGI) – one of the coordinative bodies in strategic technology areas – OCW has given a total subsidy of €271m for the implementation of the business plan 2008-2012.

Table 3: Main policy changes in the knowledge demand domain

| Challenges | Main Policy Changes |
|---|---|
| Identifying the drivers of knowledge demand | <ul style="list-style-type: none"> • No major changes since 2008 |
| Co-ordinating and channelling knowledge demands | <ul style="list-style-type: none"> • No major changes since 2008 |
| Monitoring demand fulfilment | <ul style="list-style-type: none"> • No major changes since 2008 |

2.3.3 Knowledge production

In 2008 and 2009 the lines that were set out in the [Strategic Agenda for Higher Education, Research and Science Policy](#) (2007-2011) were continued. No major changes occurred.

Table 4: Main policy changes in the knowledge production domain

| Challenges | Main Policy Changes |
|--|---|
| Improving quality and excellence of knowledge production | <ul style="list-style-type: none"> • No major changes since 2008 |
| Ensuring exploitability of knowledge production | <ul style="list-style-type: none"> • No major changes since 2008 |

2.3.4 Knowledge circulation

Since 2008 there have not been any major policy changes in the domain of cross-sector knowledge circulation, with the exception of the expansion of existing programmes (e.g. the [Innovation Vouchers](#) scheme and the [innovation programmes](#) in key areas).

Table 5: Main policy changes in the knowledge circulation domain

| Challenges | Main Policy Changes |
|---|---|
| Facilitating knowledge circulation between university, PRO and business sectors | <ul style="list-style-type: none"> • No major changes since 2008 |
| Profiting from access to international knowledge | <ul style="list-style-type: none"> • No major changes since 2008 |
| Absorptive capacity of knowledge users | <ul style="list-style-type: none"> • No major changes since 2008 |

2.4 Policy opportunities and risks related to knowledge demand and knowledge production: an assessment

Following the analysis in the previous section, this section assesses whether the recent policy changes respond to identified system weaknesses and take into account identified strengths.

The major changes occurred in 2007, when the cabinet Balkenende IV (2007-2011) took office. In 2008 not much was changed in the knowledge related policies. As a consequence, the policy related opportunities and risks remain the same.

Table 6: Summary of main policy related opportunities and risks

| Domain | Main policy related opportunities | Main policy-related risks |
|-----------------------|--|--|
| Resource mobilisation | <ul style="list-style-type: none"> • The long-term strategy for investments in knowledge and innovation could allow for a better co-ordinated and coherent approach. • The attractiveness of the Netherlands for students, knowledge workers and R&D intensive firms – also from abroad –, could be increased by creating a learning culture and research culture that fosters excellence. | <ul style="list-style-type: none"> • Efforts to raise R&D intensity fall short of ambitions (3% target). |
| Knowledge demand | <ul style="list-style-type: none"> • Key societal needs could be addressed by development of societal innovation agendas and societal innovation programmes. • Co-ordination between ministries could be made more effective (in efforts to further develop and implement a long-term strategy for research and innovation, and in developing societal innovation agendas and programmes). | <ul style="list-style-type: none"> • Too much emphasis in research policy on independent and pure scientific research and individual talented researchers might result in lack of responsiveness to knowledge demands from knowledge users outside the research system. |
| Knowledge production | <ul style="list-style-type: none"> • The Dutch research climate could be improved by more policy emphasis on “excellence” and talented researchers | <ul style="list-style-type: none"> • Notion in research policy that excellent research will, by definition, be relevant for third parties, could lead to too little emphasis on demand-oriented R&D in research policy. |
| Knowledge circulation | <ul style="list-style-type: none"> • Further improvement of coherence and continuity in policy regarding knowledge circulation and valorisation. • The Netherlands could be made a more attractive international location for (investments in) research and innovation. • Availability of a highly qualified labour force could be ensured by recent policy initiatives | <ul style="list-style-type: none"> • Too much emphasis in research policy on independent and pure scientific research and individual talented researchers might result in too little emphasis on knowledge circulation and valorisation. |

A policy-related risk remains that efforts in the Netherlands will fall short of raising the R&D intensity to 3% of GDP. Indeed, it is unlikely that this target will be reached in the near future.

Several of the policy opportunities lie in increasing the attractiveness of the Netherlands for talented students, top researchers and R&D intensive firms, also from abroad. It contributes to resource mobilisation (via provision of qualified human resources and attracting foreign R&D intensive firms), knowledge production (by fostering excellent research) and knowledge circulation (by profiting from international knowledge). However, an emphasis on independent and pure scientific research and individual talented researchers also creates policy-related risks in terms of reduced responsiveness to knowledge demands from outside the research system, reduced exploitability of knowledge and diminished cross-sector knowledge circulation. Policy should find the right balance between “excellence” and “relevance”. This will require good co-ordination between the part of the policy system that deals with scientific research and the part of the system dealing with industrial R&D and innovation. This is particularly important in efforts to create focus in mass in research and innovation. A co-ordinated long-term strategy to guide investments in knowledge is helpful in this respect.

3 National policy mixes towards R&D investment goals

The aim of this chapter is to deepen the analysis of national policy mixes with a focus on public and in particular **private R&D investment**. The [Lisbon strategy](#) emphasises an EU overall **resource mobilisation objective** for 2010 of 3% of GDP of which two thirds should come from private investment. R&D investment is seen as important yardstick for the capacity of an economy to turn the results of science and research into the commercially viable production of goods and services and hence knowledge into growth. Corresponding investment policies are mainly pursued at national level and determined with a national focus.

The chapter is structured around five questions:

1. What are the specific barriers in the country that prevent reaching the Lisbon goal? What barriers exist in the country to prevent reaching the specific targets, particularly related to the private sector R&D investments?
2. Given the above, what are the policy objectives and goals of the government that aim to tackle these barriers?
3. What Policy Mix routes are chosen to address the barriers and which specific instruments and programmes are in operation to implement these policies?
4. What have been the achievements in reaching the above mentioned R&D investment objectives and goals?
5. What are the reasons for not reaching the objectives, adaptation of the goals?

The chapter aims to capture the main dimensions of the national policies with an emphasis on private R&D investment. The chosen perspective of looking at investments in R&D is the concept of Policy Mixes. The analysis and assessment follows a stepwise approach following the five questions mentioned above.

3.1 Barriers in the research system for the achievement of R&D investment objectives

The Netherlands, as the EU27 as a whole, are far from achieving the 3% target. GERD as % of the GDP dropped with 0.02% to 1.70% in the period 2005-2007, while EU27 increased with 0.01% to 1.83%. This decline was caused by decreases in R&D expenditures by the higher education and government sectors,¹⁵ Business expenditures on R&D, however, increased slightly with 0.02% of GDP to 1.03% in the same period (EU27 increased with 0.02% to 1.17%).

¹⁵ GOVERD dropped from 0.24% to 0.22% in the period 2005-2007 (EU27 decreased from 0.25% to 0.24%). HERD decreased from 0.48% to 0.45% in the same period (EU27 increased from 0.40% to 0.41%). (Eurostat website, 17 February 2009).

In the Netherlands, there is a high level of awareness on the need to invest (more) in R&D in order to stimulate the development of “an innovative, competitive, entrepreneurial economy”, which is one of the key pillars under the [policy plan](#) of the current cabinet Balkenende IV (2007-2011).¹⁶

In the Dutch research system several barriers can be found that hamper a more substantial increase in R&D intensity. A main factor is the Dutch **sector structure** that has low R&D intensity.¹⁷ Industry constitutes a relatively small of the total Dutch economy, and, moreover, within the industry sector the high-tech sectors are relatively small. The share of SMEs innovating in-house and the share of SMEs introducing innovations are also below EU27 average.¹⁸ A limited absorptive capacity of SMEs is a barrier in the Dutch research and innovation system.

A second factor is that Dutch companies have relatively high R&D expenditures abroad (which is an indication of the openness of the Dutch economy), while foreign companies' expenditures on R&D in the Netherlands are no more than average. This creates a gap between R&D spending by Dutch companies abroad and **R&D spending by foreign companies** in the Netherlands.

The openness of the Dutch economy is also visible in the fact that the Netherlands is one of the few OECD countries that does not benefit from a positive net “brain gain”.¹⁹ Dutch knowledge workers and businesses have a strong international orientation which is not matched by a sufficiently high level of **attractiveness of the Netherlands for foreign knowledge workers and knowledge intensive businesses**. Barriers for knowledge workers from abroad have been too high.

In the Netherlands, there is a relatively large share of HRST²⁰, especially in the services sector. Because of demographic and economic trends, a growing number of new graduates in HRST is needed. A **shortage of (doctorate) graduates in science & engineering** is, however, looming. The inflow of new S&E and SSH (doctorate) graduates is below EU27 average.²¹ The low attractiveness of a career as a scientists or researcher is one of the explanatory factors. Education and the business sector are not sufficiently aligned.

The higher education in the Netherlands can be characterised as on average good, with few visible differentiations in quality. The **learning culture is not ambitious**

¹⁶ The EU Spring Council identified increasing private R&D investments as an issue that requires special attention in the Netherlands, because the Netherlands hold a below-average position as regards private R&D compared to other countries. The Netherlands is recommended to step up efforts aimed at increasing private sector R&D expenditure by avoiding fragmented policy governance structures and to put in place a coherent strategy for R&D and innovation which addresses the interaction between private R&D and public research, as well as foreign R&D investment.

¹⁷ The business sector structure of the Netherlands is characterised by a number of strong sectors, i.e. the community services, business activities and the ICT sectors, electronic equipment and office machinery industries, the chemicals and the food industry and mining (natural gas & oil) and agriculture. A very large part of R&D by Dutch businesses is performed by a limited number of large multinationals (the “big eight”): Philips (electronics), ASML (integrated circuits equipment), AkzoNobel (healthcare products, coatings, and chemicals), NXP (semiconductors), Shell (oil & gas), DSM (nutritional and pharma ingredients, performance materials and industrial chemicals), Océ (copiers), and Unilever (food, personal care). These companies tend to have a good absorptive capacity and good relations with the public knowledge infrastructure.

¹⁸ INNO-METRICS, 2008, [European Innovation Scoreboard 2008](#).

¹⁹ OCW/NOWT, 2008 and [OECD Database on immigrants and expatriates, 2005](#).

²⁰ HRST = Human resources in science and technologies.

²¹ INNO-METRICS, 2008, [European Innovation Scoreboard 2008](#).

enough – in the sense of motivation, effort, attitude and challenge – to stimulate talents to get the best out of themselves. The lack of such an ambitious learning culture also creates a barrier for more R&D investments (from abroad) because the Netherlands is not sufficiently attractive enough for foreign talented students and excellent researchers and for foreign R&D intensive firms.²²

The **alignment of universities and companies** (SMEs in particular) could be (further) improved.²³ The sector structure (with a large services sector) that has a low R&D intensity plays a role here.²⁴ Collaboration between the (relatively large) non-university research institute sector and the private enterprise sector is, however, higher than in most EU-countries.

Another factor that hampers intensification of R&D investments is a lack of coordination and continuity in policy design and implementation. The policy **governance structures have been too complex and fragmented** and a **coherent overall strategic framework for R&D and innovation policies has been lacking**. The government itself has not been active enough in its role as (launching) customer or procurer of innovative products and services.

3.2 Policy objectives addressing R&D investment and barriers

The general policy goal with regard to (industrial) R&D investments is to increase the innovativeness of the Dutch economy.²⁵ This is operationalised in objectives. Two of the most relevant for this report are:

- **Increase the number of firms (SMEs) that develop and exploit (technological) knowledge.** This objective is addressed with a “basic package” of generic support measures for businesses.²⁶
- **Create strong and internationally leading clusters in priority areas** (“key areas”) through innovation programmes. In these innovation programmes a broad range of activities can be developed to improve the performance of the sectoral ecosystems. By focussing the efforts and (R&D-) investments on a limited number of “key areas” where Dutch parties can excel, the Netherlands can create a strong international profile and improve its international competitiveness and attractiveness. Innovation programmes are also being developed in societal themes.

²² The demand for more and better educated graduates presents a dilemma with regard to quality and quantity. Up to now, universities and universities of applied sciences (“hogescholen”) in the Netherlands have succeeded in combining increasing participation with an educational quality that is fundamentally sound. But, for the future, a more ambitious learning culture is required, which also stimulates talents to excel.

²³ In the Community Innovation Survey only 12% of all innovative Dutch companies mention a university as partner. Innovative companies only seldom (3%) see universities as very important sources. (OCW/NOWT, 2008).

²⁴ Several specific business sectors in the Netherlands do, however, have relatively many innovation oriented collaborations between companies and universities and other public research institutes, especially mining (Shell and NAM), energy, natural gas and water (water treatment companies), chemical-pharmaceutical industry (DSM and Akzo Nobel) and the electrotechnical industry (Philips).

²⁵ EZ Budget 2009. 31700 XIII, nr. 2, p. 34.

²⁶ The [basic package](#) includes a fiscal scheme (WBSO), Innovation Vouchers, Innovation Performance Contracts, Technopartner (for high-tech start-ups), Syntens (a network of innovation advisors for SMEs), Small Business Innovation Research programme (SBIR), a Launching Customer initiative, an Innovation Credit scheme and a network of Offices for Science and Technology (TWA network) in various countries.

It is explicitly recognised that R&D expenditures form the basis for the innovativeness and that the Netherlands is still far removed from the 3% ambition.

Other (partly overlapping) policy goals related to R&D investments can be found in the cabinet's industrial policy.²⁷ Policy goals are: to increase the **attractiveness** of the Netherlands for foreign talented knowledge workers and create a "selective welcoming" labour migration policy for the higher segments of the labour market;²⁸ to strengthen the connection between **education and the labour market**; to increase the number of **graduates in science & engineering**; to improve the interaction between **companies and knowledge institutes**; and to increase the **role of the government** as (launching) customer by developing societal innovation programmes, a launching customer initiative, SBIR and adapting procurement rules.

In the [Strategic Agenda for Higher Education, Research and Science Policy](#) includes two central policy objectives: (1) to create an **ambitious learning culture** in the higher education system; and (2) to create an **excellent research climate** by strengthening the leading role of fundamental scientific research, a greater focus on national research priorities, a solid societal embedding of scientific research and autonomy of universities and proper quality assessment.

The interdepartmental long-term strategy "[Towards an agenda for sustainable productivity growth](#)" presents the vision and ambitions of the cabinet for the Dutch society and economy in 2030.²⁹ Three policy agendas are relevant in the context of R&D investments. Policy goals in the *Agenda Talents* include: a more **ambitious learning culture** (through differentiation and excellence); more **HRST**, more **international (inward) mobility**; and **life-long learning**. Policy goals in the *Agenda Research* are to excel with **pioneering research** and **excellent research training**; to increase **(foreign) private investments in R&D**; and more dynamics in the research system through **PPPs** and more **focus and mass** in areas that are important for the Dutch society and economy. Policy goals in *Agenda Entrepreneurship* are more business enterprises by stimulating **entrepreneurship in education**; to make **start-up and further growth** of business enterprises easier; reduction of **regulatory burdens**; faster and better **public service provision** to businesses; to improve availability of **venture capital**; to stimulate **innovation in SMEs**; and more **market orientation** in the (semi-)public sector (e.g. government as customer/procurer).

²⁷ EZ, [Industry Memorandum 2008](#)

²⁸ This will be achieved by implementing in 2009 the action plan "[Towards a Modern Migration Policy](#)". The interdepartmental project "Chain Approach Knowledge Migrants" covers the integral chain from "branding" to "living". Since 2004 the Knowledge Migrants measure is operational.

²⁹ The [long-term strategy](#) was published in July 2008 by the interdepartmental "Knowledge & Innovation" programme department (K&I).

Objectives in the long-term strategy

Objectives with regard to the AgendaTalents:

- Participation in Higher Education from 44% to 50% in 2011
- Outflow of S&T graduates from 17,742 to 20,403 in 2011
- International position of knowledge institutes from 1 to 3 universities in top-100 of the Shanghai index in 2011
- Participation of life-long learning from 15.9% to 20% in 2011

Objectives with regard to the Agenda Public and Private Research:

- Public research from 0.71% of GDP to 1.0% of GDP in 2011
- Share of innovative companies that collaborate with universities and research non-university institutes to top-5 of EU
- Private investments in R&D from 0.96% of GDP to 2.0% of GDP in 2011
- Foreign investments in R&D from 30% to 50% of the private R&D investments

Objectives with regard to the Agenda innovative entrepreneurship

- Share of innovative SMEs in industry and in services to top-5 of EU
- Attitude regarding entrepreneurship (TEA) to top-5 of EU
- Turnover of “technostarters” from €1.95b to €2.65b in 2011 and share of fast growing SMEs from 6.6% to 9.6% in 2011
- Share of turnover from new or improved products in industry and in services to top-5 of EU

It can be concluded that the officially stated policy goals and objectives do address the relevant challenges and weaknesses. The sector structure with a relatively low R&D intensity and relatively few innovative SMEs is translated in policy goals to increase the numbers of firms that develop and exploit (technological) knowledge. The insufficient attractiveness of the Netherlands for talents and R&D-intensive firms is also translated into official policy goals, in research policy as well as innovation, industrial and education policies. A (looming) shortage of knowledge workers (especially in science and engineering) is also recognised in various official policy objectives. The same goes for the lack of alignment between public knowledge institutes and the private sector. With the establishment of the interdepartmental [“Knowledge & Innovation” programme department](#) some of the barriers relating to the role of the government in the research and innovation system are addressed.

3.3 Characteristics of the policy mix to foster R&D investment

This section is about the characterisation and governance of the national policy and instrument mix chosen to foster public and private R&D investment. While policy goals are often stated at a general level, the policy mix has a focus on how these policy goals are implemented in practice. The question is what tools and instruments have been set up and are in operation to achieve the policy goals? The following sections will each try to tackle a number of these dimensions.

3.3.1 Overall funding mechanisms

The national government is a relatively large R&D funding source.³⁰ Within the national government, the ministry of OCW is by far the largest funder of R&D with

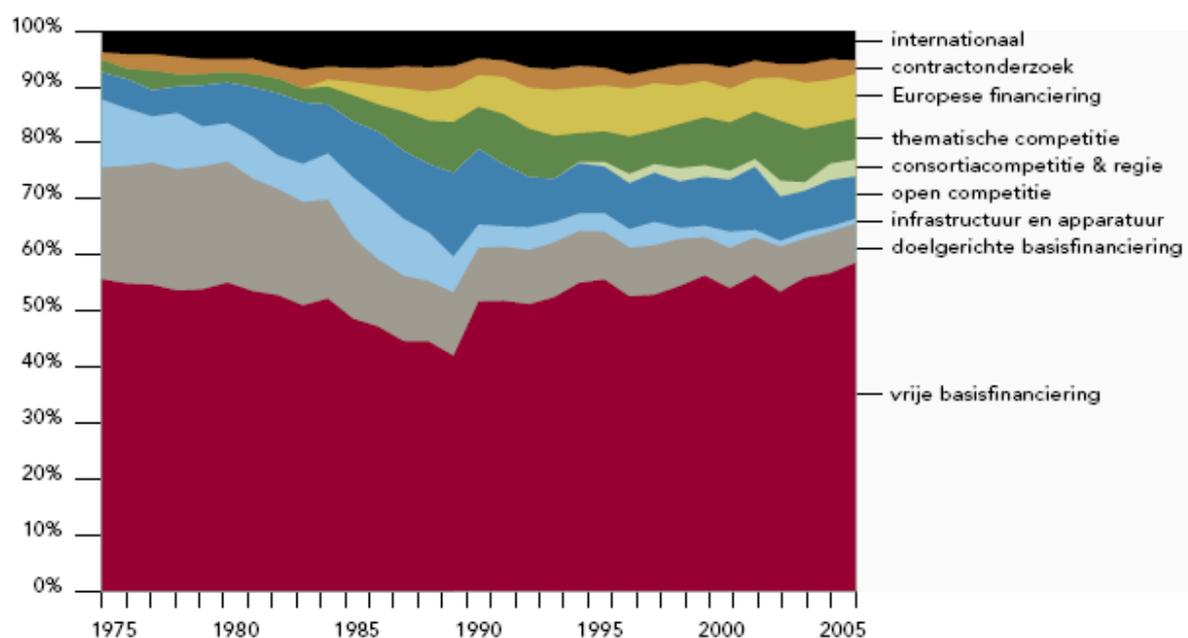
³⁰ The government funds ca. 37% of all R&D performed in the Netherlands. The business enterprise sector funds 49%, 12% comes from abroad, and the remaining 1% comes from various national sources.

66% (ca. €2.7b) of the total R&D expenditures by the national government in 2008 (ca. €4.1b).³¹ The ministry of EZ follows with 17% (ca. €705m) and the ministry of Agriculture, Nature and Food Quality with 5% (ca. €205m). The remaining 12% is allocated by the other nine ministries. Within the ministry of OCW the R&D budget is dominated by the block grant to universities (70%, or ca. €1.9b).

Most of the governmental R&D funding goes to universities (ca. 64%), followed by (semi-)public research institutes (ca. 30%) and business enterprises (ca. 6%).

In the figure below, the shares of different types of public funding are presented.³² The figure shows that the share of lump sum institutional base funding has increased in recent years. The shares of theme-based competition, consortia-based competition and funding of European projects have increased as well. The financing of international research collaboration is rather stable. The targeted base funding of research institutes and subsidies for infrastructure and apparatus, however, has decreased.

Figure 2: Public expenditure on research per type of funding (as % of total), 1975-2005



Bron: Eigen berekening op basis van de TOF-gegevens 1975-2005

Rathenau Instituut

A relatively new mode of (programmatic) R&D funding since the 1990s is competition between consortia of public and private parties. The goal of this type of instrument is to create more “focus and mass” and to improve public-private interaction and coordination in the prioritised areas. Given its size, the Netherlands cannot excel in all areas, so choices have to be made (i.e. “focus and mass”). The total size of the

³¹ Ca. €3,900 excluding flows abroad. (OCW, Overzicht Totale Onderzoek Financiering (TOF) 2006–2012, 29338, nr. 71).

³² Translation of the different types of funding from the bottom up: free base (lump sum) funding, targeted (institutional) base funding, infrastructure and apparatus, open competition, consortia competition & coordination, theme-based competition, European funding, contract research, international funding. Source: Rathenau (2007): [Dertig jaar publieke onderzoeksfinanciering in Nederland 1975-2005](#).

consortia-based funding is relatively small, but because the funds are concentrated in a few areas and because there has been a quick succession of this type of instruments, these instruments have been very visible. Moreover, this type of funding often requires co-funding, thus tying up parts of the block grant to universities.

Another change in the government's approach to R&D funding has been a recent shift of €100m from the lump sum funding (block grant) of universities (ca. 5% of total lump sum funding) to competitive funding of talented researchers in an attempt to make R&D funding more performance-based and to create more room for talents. The rationale is that individual researchers know best how, where and with whom to achieve excellence (resulting in bottom-up focus and mass).

The balance between generic and thematic instruments has shifted somewhat with the introduction of the "programmatic approach" of the ministry of EZ in 2005 – as part of streamlining of the innovation policy mix. The total amount of funding for the thematic innovation programmes in key areas is, however, relatively small in comparison with the total governmental funding of R&D (*i.e.*, ca €100m/year or 2.5%). The generic fiscal scheme WBSO is, for instance, much larger with a budgetary weight of €427m in 2009 (increasing to €542m/year in 2011).

It can be concluded that generic R&D funding remains higher than specific R&D funding. With regard to the balance between supporting existing strengths and new emerging areas, in broad lines the ministry of EZ supports current R&D specialisations in key areas, while the ministry of OCW supports new emerging areas (e.g. in nanotechnology, ICT, advanced chemistry and genomics/life sciences).

3.3.2 Policy Mix Routes

The "[Policy Mix Project](#)" identified the following six 'routes' to stimulate R&D investment:

7. promoting the establishment of new indigenous R&D performing firms;
8. stimulating greater R&D investment in R&D performing firms;
9. stimulating firms that do not perform R&D yet to perform R&D;
10. attracting R&D-performing firms from abroad;
11. increasing extramural R&D carried out in cooperation with the public sector or other firms;
12. increasing R&D in the public sector.

The routes cover the major ways of increasing public and private R&D expenditures in a country. Each route is associated with a different target group, though there are overlaps across routes. The routes are not mutually exclusive as, for example, competitiveness poles of cluster strategies aim to act on several routes at a time. Within one 'route', the policy portfolio varies from country to country and region to region depending to policy traditions, specific needs of the system etc.

Route 1: Promoting the establishment of new indigenous R&D performing firms

Since 2004 the first route is mainly covered by the integral programme [TechnoPartner](#), which stimulates and helps entrepreneurial individuals that want to start an enterprise based on a technological innovation. EZ allocates ca. €30m/year

to TechnoPartner. TechnoPartner carries out four programmes to improve the Dutch technostarter's climate.

- The [TechnoPartner Knowledge Exploitation funding programme \(SKE\)](#) encourages consortia of public knowledge institutes and private parties to set up knowledge-intensive and innovative companies. In order to minimise risks and increase the techno starters' chances of success, TechnoPartner provides support with regard to screening of research and scouting of entrepreneurs, patents, access to equipment, coaching and support, and provision of pre-seed funding.
- The [TechnoPartner SEED-facility](#) improves supply of venture capital for technostarters via co-financing in venture capital funds.
- [TechnoPartner Certificate](#) decreases the risk for banks (the Dutch Government guarantees the bank loan) to finance technostarters and increases the chance for technostarters to get financing.
- [TechnoPartner Business Angel Programme \(BAP\)](#) informs (starting) entrepreneurs and starting informal investors (virgin angels) about the possibilities of informal investment via information sessions on Starting Capital and a booklet 'Starting Capital'.

TechnoPartner also has an international dimension. It supports entrepreneurs from abroad who want to start a new company in the Netherlands, and it helps technostarters to internationalise.

In addition, a fiscal measure ("[Regeling Durfkapitaal](#)") exists which makes it fiscally attractive for individuals to lend money to starting entrepreneurs. The [Valorisation Grants](#) programme aims to stimulate commercialisation of knowledge and know-how within public knowledge institutes by awarding grants to researchers that want to explore the possibilities of knowledge valorisation.

In comparison with the other routes, Route 1 is not one of the dominant routes to stimulate R&D investment. Thanks to integral programme TechnoPartner the approach to technostarters is, however, characterised by continuity and coherence.

Route 2: Stimulating greater R&D investment in R&D performing firms

The generic fiscal scheme [WBSO](#) (R&D Promotion Act) is the main policy instrument to stimulate companies to invest (more) in R&D since 1994. The WBSO alleviates the wage burden of R&D workers for companies through tax reduction.³³ Its budgetary weight increased in 2009 with €39m to €466m/year (increasing to €542m/year in 2011), which makes the WBSO by far the largest scheme in the Dutch innovation policy mix. (Routes 1 and 3 are also relevant).

The [Innovation credit](#) scheme is a new risk-bearing credit for the financing of R&D projects with high commercial potential but substantial technological risks. The budgetary weight is €21m in 2008 but will increase to €50m/year in 2010.

³³ There are three facilities: a reduction in taxes on wages of R&D workers; an R&D deduction for self-employed entrepreneurs; and an additional allowance for starting entrepreneurs or companies. Each year, more than 12,000 companies use the WBSO.

The [Innovation Performance Contracts](#) (IPC) scheme aims at facilitating collaboration and the transfer of knowledge within a group of SMEs.³⁴ The budgetary size is ca. €20m/year.

[Eurostars](#) is a new European innovation programme. The Netherlands is one of the 31 Eureka-countries that, together with the EC, have made available funding for support of R&D projects by (high-tech) SMEs. The budgetary size is €2m/year.

The Dutch government experiments since 2004 with a small scale [Small Business Innovation Research](#) (SBIR) pilot programme inspired by the US SBIR programme. Contracts are awarded in a three-phase competition: feasibility, research phase and commercialisation.³⁵ The goal of this innovative procurement programme to stimulate R&D and innovation by SMEs and to contribute to solving societal problems. Seven SBIR pilots were started since 2004 within four different ministries. The budget per pilot is approximately €1.1m/pilot.

In comparison with other routes, Route 2 is very important route to stimulate R&D.

Route 3: Stimulating firms that do not perform R&D yet to perform R&D

The [Innovation Vouchers](#) scheme promotes knowledge transfer from knowledge institutes to SMEs to make them more innovative and R&D-intensive. (Routes 2 and 5 are also relevant). The budgetary size is ca. €30m/year.

[Syntens](#) is an innovation network of 15 regional centres with some 250 advisors that provide support and advice to SMEs on technology and innovation. The budgetary weight is €32m/year (EZ contribution). (Routes 2 and 5 are also relevant)

In comparison with other routes, Route 3 is probably the least dominant, but it does profit from measures that fall under Route 1. For instance, the [WBSO](#) scheme (see Route 1) is also available for firms that start to perform R&D for the first time.

Route 4: Attracting R&D-performing firms from abroad

Attracting R&D-performing firms from abroad has received more attention in the last five years. In 2006, EZ published the policy memorandum "[In action for acquisition](#)" which set out the policies to attract more foreign investments, also in R&D. In general, the Dutch government aims to create an attractive climate for R&D intensive firms from abroad in terms of an attractive fiscal climate (especially for headquarters of multinational corporations), an ambitious learning culture and an excellent research climate.

The [Netherlands Foreign Investment Agency](#) (NFIA) has been set up for the specific purpose of helping and advising foreign companies who wish to take advantage of the Dutch business environment as a strategic base to cover Europe. It provides information and practical assistance free of charge and on a confidential basis.³⁶

For many years, the Netherlands has a network of Offices for Science and Technology ([TWA network](#)) in various countries. Both the NFIA and the TWA network

³⁴ Participants may belong to the same supply chain, region, or sector, or they may have a specific theme in common.

³⁵ The unique feature of the SBIR programme is that the contracting authority fully funds the first two phases, whilst the resulting intellectual property remains with the company. This way, especially SMEs are encouraged to become more innovative.

³⁶ The NFIA has offices in Europe (HQ in The Hague, London), the US (New York, Boston, Chicago, Atlanta, San Mateo), Asia (Tokyo, Osaka, Taipei, Hong Kong, Shanghai, Beijing, Guangzhou, Seoul, New Delhi, Singapore and Kuala Lumpur) and in the Gulf Region (Dubai).

are operational units of the agency for international business and cooperation (EVD), which in turn is part of the ministry of EZ.

Increasingly, the [innovation programmes](#) in the key areas of the Dutch economy (see Route 5) are used to create a recognisable profile (or “brand”) of the Netherlands and to attract foreign R&D intensive firms to the Netherlands.

With several instruments to stimulate talented researchers (e.g. the [Innovational Research Incentives Scheme](#), €150m/year) and excellent research facilities, the government aims to create a more attractive research climate, also for foreign researchers and foreign R&D intensive firms.

In comparison with other routes, Route 4 becomes increasingly important, but it is mainly addressed via other Routes (especially 2, 5 and 6).

Route 5: Increasing extramural R&D carried out in cooperation with the public sector

Route 5 has become increasingly important with the introduction of the programmatic approach in 2005. This was part of a renewal and streamlining of EZ’s policy mix which created a “[basic package](#)” of generic instruments for all entrepreneurs and a “[programmatic package](#)” with specific instruments targeted at “key areas”. The goal of the programmatic approach is to bundle strengths of large companies, SMEs, public knowledge institutes and the government to develop strategic areas that have a strong impact upon the whole Dutch economy. A new balance was created between the use of generic and specific instruments. At the national level, the government aims to support strong and promising R&D and innovation developments with an interrelated set of programmes targeting specific sectors and regions.

In 2008 there are eight [innovation programmes](#) that have been developed in close interaction, in a bottom-up fashion, with relevant actors. These programmes aim to remove barriers in sectoral innovation ecosystems. Therefore, actions are not limited to ‘traditional’ R&D projects and programmes, but can also address human resources and promotion of entrepreneurship. The budgetary weight is substantial. For the period 2005-2012 €846m is allocated for the eight innovation programmes³⁷, which amount to ca. €105m/year.

In 1997 the first four [Technological Top Institutes](#) (TTIs) were established as “centres of excellence” based on PPPs. In 2008, nine such TTIs are active. They have become part of the programmatic approach and play important roles in the performance of the R&D in the innovation programmes. The TTIs are funded from various sources (e.g. EZ budget for innovation programmes and the FES).

The regional innovation programmes (“[Peaks in the Delta](#)”) aim to support strong regional clusters. For the periode 2007-2010 six programmes have been set up in six regions. EZ allocates an average of €68m/year to the programmes.

³⁷ This includes funding from the Economic Structure Enhancement Fund (FES), which is filled with revenues from natural gas exploitation and is used (inter alia) for public investments in physical infrastructure and knowledge infrastructure.

From the FES substantial sums have been made available for collaborative R&D and innovation. In 2009, a new impulse of €500m will be given to consortia of public and private parties for multi-year projects in eight themes.³⁸

Route 6: Increasing R&D in the public sector

The largest stream of public research funding is the lump sum institutional funding (block grant) of the 14 Dutch universities (ca. €1.9b/year). This so-called “first stream” is complemented by a “second stream” of funding in competition mainly via the national research council NWO (ca. €300m/year).³⁹ In 2007, the minister of OCW decided to transfer €100m/year from the lump sum to the second stream to make funding more performance-based (as part of the effort to create an excellent research culture in the Netherlands).

NWO and the Royal Netherlands Academy of Arts and Sciences (KNAW) both have a number of research institutes for fundamental research under their wings that receive institutional funding. (ca. €230m/year for 28 institutes).

In the area of applied research, there are also a number of public research institutes, including TNO and four Large Technological Institutes. The base funding of the institutes is gradually replaced by programmatic funding, in order to better align knowledge supply and demand (from the government).

The importance of education and innovation policies

(Higher) education policy is mainly shaped by the ministry of OCW, while non-R&D innovation policies are mainly developed by the ministry of EZ. [Education policy](#) does affect R&D investment. First, via efforts to increase the number of new graduates – especially in science & engineering – to increase (cross-sector) mobility and to align education and business needs. An important policy plan in this respect is the “[Delta plan Science & Technology](#)”. As part of the Delta plan, 14 technocentres were established as intermediary organisations to solve bottlenecks in regional labour markets for technical professions. Furthermore, practice-oriented research in universities of applied sciences (HBO or “hogescholen”) is stimulated via lectors and a so-called [RAAK](#)-subsidy⁴⁰. The three Universities of Technology have received a subsidy for joint centers of excellence and other collaborations (“[3TU.Federation](#)”). OCW’s [Strategic agenda for higher education, research and science policy](#) (2007-2011) explicitly states that an excellent research climate requires independence, transparent accountability and a satisfactory quality assessment. Therefore, higher education policy leaves much autonomy to the (professional) universities. This autonomy is accompanied by various obligations, e.g. to maintain a system of quality assurance. An excellent research climate will help to attract R&D performing firms from abroad. Thus, education policies influence Routes 2 (ensuring sufficient supply for well-educated graduates), 4 (ensuring an excellent research climate) and 5 (orienting higher education institutes to the private sector) in particular.

³⁸ The 8 themes are high-tech systems & materials; food & flowers; life sciences & health; water, climate and spatial research; ICT; advanced chemistry and energy; creative industries and education.

³⁹ In 2008 NWO spent €103m on programmes for talented individual researchers. €93m was allocated in free competition to research projects. €22m was spent on research infrastructure and €45m on (very) large facilities. €33m was given to societal research programmes.

⁴⁰ RAAK is an acronym of Regional Attention and Action for Knowledge circulation. The aim is to improve knowledge exchange between (higher) education institutes and SMEs and/or the public sector.

The ministry of EZ has various instruments to stimulate non-R&D innovation. Especially the measures in the context of [entrepreneurship policy](#) influence Routes 1, 2 and 4 in particular. The main policy goal in entrepreneurship policy is to create both more and better entrepreneurs. Entrepreneurs in all stages of a company's development (start-up, growth, exit) need to be free to conduct their business. Specific policy objectives that are also relevant for R&D performance by SMEs include: less administrative burden and red tape; more funding for starters; more opportunities for innovation and fast growth; a greater focus on entrepreneurship in education; encouraging international enterprise; and focus on a secure business environment.

There are various coordination mechanisms in place to create alignment between the various policies in the knowledge triangle. The [Innovation Platform](#) is the main coordinative body for policies in education, research and innovation. Furthermore, the [interdepartmental "Knowledge & Innovation" programme department](#) (K&I) was established in 2007 to increase coherence in policies on knowledge, innovation and entrepreneurship.

Other policies that affect R&D investments are energy and environmental policies. In the work programme "Clean and Efficient: new energy for the climate" the cabinet presents the ambitions for energy saving, sustainable energy and reduction of CO₂-emissions. Various instruments are in place that have an R&D-component.⁴¹

Fiscal policy is also explicitly aimed at creating a good business and investment climate for foreign companies, especially headquarters of multinational corporations.

Assessment of the importance of policy mix routes and their balance

Table 7: Importance of routes in the national policy and recent changes

| Route | Short assessment of the importance of the route in the national policy | Main policy changes since 2008 |
|-------|--|--|
| 1 | Important, but relatively small in terms of budgetary weight | <ul style="list-style-type: none"> No significant changes |
| 2 | Very important, also in terms of budgetary weight | <ul style="list-style-type: none"> WBSO budget significantly increased with €39m in 2009 Innovation Credit scheme introduced in 2008. Budget increased to €40m/yr in 2009 Eurostars (Eureka) introduced The SBIR scheme leaves pilot phase in 2009 The IPC scheme will be improved in 2009 More attention for the government as launching customer |
| 3 | Relatively low importance, also small in terms of budgetary weight | <ul style="list-style-type: none"> The Innovation Voucher scheme is intensified and broadened in 2008-2010. |

⁴¹ SenterNovem's projects are grouped into four themes: Encouraging Innovation; Reducing Climate Change; Towards Sustainable Energy; and Towards a Better Environment.

| Route | Short assessment of the importance of the route in the national policy | Main policy changes since 2008 |
|-------|--|--|
| 4 | Increasingly important, but mainly addressed indirectly via other routes | <ul style="list-style-type: none"> • In 2009 more is invested in the international aspects of the innovation programmes in the key areas • Via FES an additional €125m is made available to improve the international local appeal in four regions • Through European Territorial Collaboration several ambitious projects will be set up in the border-regions in 2009 |
| 5 | Highly (and increasingly) important, with growing budgetary weight | <ul style="list-style-type: none"> • New investment impulse from FES in public-private consortia in 2009 (€500m in total) |
| 6 | By far the most important route, also in terms of budgetary weight | <ul style="list-style-type: none"> • Transfer of €100m/yr from lump sum funding of universities to talent scheme • Institutional base funding of technological research institutes replaced by programmatic funding • Subsidy of €271m in genomics research for 2008-2012 |

3.4 Progress towards national R&D investment targets

The actual R&D investments in the Netherlands are still far removed from the target of 3% of GDP. Especially the business expenditures on R&D remain stable at ca. 1% of GDP, which is a long way from the official target of 2%. R&D expenditures by the government sector and the higher education sector show a declining trend from 0.75% in 2004 to 0.67% in 2007. The share of government budget appropriations or outlays for R&D as % of GDP has decreased from 0.83% in 1997 to 0.70% in 2007.⁴² Total GBAORD as a % of total general government expenditure, however has increased gradually from 1.15% in 1997 to 1.42% in 2007 (EU27=1.55%). Nevertheless, it is unlikely that the government will be able to increase the share of its budget appropriations or outlays for R&D substantially in the coming years, especially in view of the current economic recession. It can be concluded that the degree of compliance with national R&D investment targets is not high.

Because of the economic recession, R&D investments by the private sector cannot be expected to increase substantially in the near future. Indeed, several large R&D intensive companies will probably be forced to cut expenditures on R&D. R&D intensive companies will find it increasingly difficult to continue to invest in innovation and R&D. R&D workers will be laid off, which will weaken the focus areas and public-private partnerships. On 25 March 2009, the Government presented '[Working on the Future](#)', a policy agreement augmenting the 2007 coalition agreement '[Working Together, Living Together](#)'. The new policy agreement contains the Dutch crisis package aimed at achieving economic recovery. With regard to R&D and innovation, several measures are presented. For the years 2009 and 2010, €280m is made available for temporary occupation (on secondment basis) of knowledge workers from the private sector in knowledge institutes in the (semi-)public sector. This should avoid that knowledge workers will have to be laid off and ensure that they are still available for the Dutch knowledge economy once the economy recovers. In addition, €110m is available for the years 2009-2010 (and €390m for 2011 and beyond) for the continuation of successful existing innovation programmes. For the fast

⁴² Eurostat

implementation of new innovation programmes, €218m is available for 2009-2010. In addition, the fiscal scheme WBSO is broadened with €150m in both 2009 and 2010.

A main reason for insufficient progress towards the R&D investment targets is that the objective to raise private R&D investments from 1% to 2% of the GDP seems unrealistic, because of the large share of the services sector in the Dutch sector. Not only is the services sector not as R&D intensive as the (high-tech) industry sector, but R&D in the services sector is not captured adequately with current measurement methods.⁴³ Indeed, it could be doubted if it would be wise to strive for the 2% too rigorously and too quickly. The Dutch sector composition is playing an important role, but it does not explain everything. A main factor appears to be that the Netherlands is not sufficiently attractive for foreign companies to perform R&D. Moreover, insufficient location attractiveness may also result in Dutch companies relocating their research centres. To increase private R&D investments, policy should probably focus more on improving the attractiveness of the Netherlands for R&D-intensive companies by having enough knowledge workers, world-class knowledge institutions and research facilities and a dynamism which encourages innovation. Efforts from both the public and public parties are needed. Extra (structural) investments in knowledge will be necessary. In the longer term, this would also change the Netherlands' sector structure.

In a similar vein, the Knowledge Investment Agenda of the Innovation Platform focuses on the creation of a "knowledge society" which is attractive for (foreign) researchers and R&D performing firms. Relatively low investments in R&D are one among several bottlenecks that need to be addressed simultaneously. Other barriers are a lack of dynamics or renewal in terms of entry and growth of new innovative businesses and inflow of talented (foreign) knowledge workers. A culture of egalitarianism is also a problem because it hampers excellence. Linkages in the innovation system between public and private parties are also not sufficiently strong. Finally, an integral strategy for knowledge and innovation policy has been lacking.⁴⁴

While there are no major gaps in the portfolio of instruments used to increase R&D investments, more attention could be paid to Route 4 (Attracting R&D-performing firms from abroad) and Route 6 (Increasing R&D in the public sector).

Table 8: Main barriers to R&D investments and respective policy opportunities and risks

| Barriers to R&D investment | Opportunities and Risks generated by the policy mix |
|---|---|
| Sector structure with low R&D intensity | More R&D intensive firms, also from abroad, are needed. |
| SMEs not sufficiently innovative | The "basic package" in the policy mix is more focused on stimulating greater R&D investment in R&D performing firms than of stimulating firms that do not perform R&D yet to perform R&D. |
| Attractiveness of the Netherlands for foreign knowledge workers and R&D intensive firms | Policy has recognised this barrier, but more could be done (also in terms of raising knowledge investments, e.g. in research infrastructure) |

⁴³ IP, 2008, First annual 'picture' Knowledge Investment Agenda.

⁴⁴ IP, 2006, Knowledge Investment Agenda 2006 – 2016.

| Barriers to R&D investment | Opportunities and Risks generated by the policy mix |
|---|---|
| Looming shortage of graduates in S&T | The Delta Plan S&T has started to have good effects. |
| Learning culture not ambitious enough | The new Strategic Agenda for Higher Education, Research and Science Policy has identified the improvement of the learning culture as a major aim. Various measures have been developed. |
| Low degree of interaction between universities and SMEs | The Innovation Voucher scheme is a first step towards increasing interaction between universities and SMEs. |
| Governance structures too complex and fragmented | An interdepartmental "Knowledge & Innovation" programme department has been set up and an long-term strategy for knowledge investments has been developed, but a more thorough policy streamlining and a more integral approach of the knowledge triangle would be helpful. |

4 Contributions of national policies to the European Research Area

ERAWATCH country reports 2008 provide a succinct and concise analysis of the ERA dimension in the national R&D system of the country. This Chapter further develops this analysis and provides a more thorough discussion of the national contributions to the realisation of the European Research Area (ERA). An important background policy document for the definition of ERA policies is the Green paper on ERA⁴⁵ which comprises six policy dimensions, the so-called six pillars of ERA. Based on the Green Paper and complementing other ongoing studies and activities, this chapter investigates the main national policy activities contributing to the following four dimensions/pillars of ERA:

- Developing a European labour market of researchers facilitating mobility and promoting researcher careers
- Building world-class infrastructures accessible to research teams from across Europe and the world
- Modernising research organisations, in particular universities, with the aim to promote scientific excellence and effective knowledge sharing
- Opening up and co-ordination of national research programmes

In the ERA dimension, the *wider context of internationalisation of R&D policies* is also an issue related to all ERA policy pillars and is normally present in the dynamics of national ERA-relevant policies in many countries.

⁴⁵ Commission of the European Communities: Green paper: The European Research Area: New perspectives. Brussels 4.4.2007, COM(2007) 161final (see http://ec.europa.eu/research/era/pdf/era_gp_final_en.pdf).

4.1 Towards a European labour market for researchers

The Dutch labour market for researchers faces several bottlenecks.⁴⁶ First, knowledge institutes tend to have **limited resources** to employ young researchers (on a permanent basis). Second, a tightening labour market (before the financial crisis) combined with a problematic image of the university as employer has resulted in a weak competitive position of knowledge institutes and a reluctance of talented students to choose for a career as researcher. **Young talent is not sufficiently retained nor attracted** (from abroad). Third, research **staff is ageing**, especially in the higher echelons. Finally, the inflow and subsequent career development of **women researchers** and researchers from ethnic minorities is too low. As a consequence, they are underrepresented in the research staff (and management) of universities.

The decreasing number of talented students that chose a career as scientific researcher results in a relatively low number of PhD candidates per head of the Dutch population. **Low salaries** and a **lack of career perspective** are important factors. Within universities it is difficult to make a career, and outside the universities there is little demand for doctorates. This is related to the relatively low R&D investments in the Netherlands and the relatively low societal status of a PhD degree. In practice, there is **no real labour market for doctoral graduates** in the Netherlands.⁴⁷ In addition, most research is performed by PhD candidates rather than postdocs. The **lack of postdoc positions** contributes to worsening career perspectives. Postdocs often find it difficult to get a permanent position at a university. Most of them are forced to find an occupation outside the universities – after having had several temporary postdoc positions. The training for PhD candidates tends to be too specialised or narrow for the business enterprise sector. The **alignment of research training and the labour market** outside the university sector is insufficient. Although the training of PhD candidates is in general of good quality, there is room for improvement in supervision and a broadening of the training.

Unemployment of doctoral graduates is not a major problem: 90% has a job. Most of them work in the business enterprise sector. About 20% works as a researcher. Of these 20%, ca. one quarter works in the higher education sector.⁴⁸

4.1.1 Policies for opening up the national labour market for researchers

International aspects of research policy are elaborated in OCW's "[Internationalisation Agenda](#)".⁴⁹ "High quality" is a leading notion in Dutch research and higher education policy. On the one hand, internationalisation contributes to the quality of higher education, research and science, and on the other hand internationalisation demands for quality because the Netherlands has to become more attractive for foreign students, teachers and researchers. Key trends that are discussed in the Internationalisation Agenda are the increasing international competition for "knowledge workers", global problems that require global solutions, the internationalisation of the Dutch labour market, and competition with foreign institutes

⁴⁶ OCW, 2008, Beleidsdoorlichting artikel 16 OCW-begroting "Onderzoek en wetenschapsbeleid". Eindrapport van een evaluatie van de operationele doelstelling: "Zorgen voor instroom, behoud en doorstroom van talentvolle onderzoekers".

⁴⁷ OCW, 2005, Making the most of talented researchers.

⁴⁸ CBS, 2007, Careers of Doctorate Holders 2005,

⁴⁹ OCW, 2008, Internationaliseringsagenda: "Het grenzeloze goed".

to attract the best students and researchers. Four actions are presented: (1) to increase the **mobility** of Dutch students; (2) to stimulate a more **international orientation** of knowledge institutes; (3) to increase of “**brain circulation**”; and (4) to improve the **location climate** for knowledge institutes.

With regard to the increase of “brain circulation” the minister of OCW has announced that he will **map the barriers** for international mobility (e.g. in terms of social security and pensions) and that he will collaborate with other ministries and Member States to explore how international mobility can be improved.⁵⁰ OCW also supports the Innovation Platform’s “**Taskforce 1000 PhDs**” (launched in October 2008) in its efforts to attract international top PhD candidates and doctoral graduates.

There are several measures in the Netherlands that stimulate mobility of researchers (e.g. NWO [Rubicon](#)-mobility grants, NWO exchange programmes with China, Japan, South Korea and Taiwan, NWO [Visitors Travel Grant](#) for foreign senior researchers and grants of universities). In addition, the [Innovational Research Incentives scheme](#) is made accessible for foreign researchers that want to come to the Netherlands. Dutch researchers actively participate in European programmes such as [Marie Curie actions](#) and [ERC grants](#).

With regard to the improvement of the location climate, policy aims to (1) improve the “**knowledge migrant scheme**”; (2) reduce the bureaucracy and provide good **support for knowledge migrants**; (3) stimulate **research infrastructure** of high quality; and (4) stimulate good **training of researchers**, for instance by initiating pilots with “graduate schools” based on the American graduate schools.⁵¹

There are no explicit Dutch policies that aim for a greater degree of standardisation of national PhD programmes with those in other countries. English is often used as a spoken language in PhD courses, also because many PhD candidates are from outside the Netherlands (and most Dutch students are relatively good at English). Dissertations can be written in either Dutch or English.

Currently, Dutch universities are prevented from offering a full qualification on foreign soil. This prevents deeper forms of international engagement, such as stand-alone or partner-based campuses in other nations, which can also be used as platforms for other activities such as foreign student recruitment into the Netherlands, research collaboration, and links to foreign industry.⁵² The minister of OCW has announced that in the future, Dutch universities will be allowed to offer a degree at foreign soil.⁵³

In the Netherlands, universities have a large degree of autonomy, also in HRM policy. There is no national legislation that regulates (access to) permanent research positions and that helps or hinders the openness towards non-nationals.

Researchers that are going to work in the Netherlands (e.g. as a PhD candidate or postdoc) may need to apply for an **entry visa** before arrival and/or a **residence permit** after arrival. In certain cases a **work permit** may also be needed. This depends on the purpose of stay; the intended duration of the stay; and the nationality. Nationals from the EU and countries such as the USA, Canada and Japan do **not** need an entry visa to enter the Netherlands. The university can usually

⁵⁰ This was a response to the action plan of the European Commission “Better careers and more mobility: a European Partnership for Researchers”.

⁵¹ PhD candidates will have more freedom to choose the best graduate school, to choose their own research orientation, and to choose their own promoter.

⁵² OECD Review of Tertiary Education in the Netherlands, 2008.

⁵³ OCW, Internationaliseringsagenda: Het grenzeloze goed.

apply for an entry visa for labour through a short procedure which takes about two months. The entry visa will only be issued if the university obtains a work permit for the candidate involved. A work permit is only required for nationals outside EU/EER.⁵⁴

It should be noted that Dutch immigration laws regard all academic work beyond the master's level as work. This means that **PhD candidates** are generally regarded in immigration law **as employees** (not students). As a consequence, a residence permit for the purpose of labour may be required, even if there is no appointment or salary involved.

The Netherlands is one of the few countries in Europe, indeed in the world, where the PhD candidate has the status of employee. In the global competition for research talent this has advantages and disadvantages. A disadvantage of the employee status is that it does not fit well with the bachelor-master-PhD structure. (The Anglo-Saxon model treats PhD candidates as students). A second disadvantage is that it is relatively expensive, which partly explains why the number of doctoral graduates is relatively low in the Netherlands. (Another reason is that the duration of a PhD is longer than in most countries (four years)). An advantage of the employee status is that the labour conditions are relatively good, which increases the attractiveness of the Netherlands.

Visiting researchers must make sure they have adequate **healthcare insurance** during their stay in the Netherlands. Everyone residing in the Netherlands has this obligation. For foreign nationals, an insurance check is part of the immigration procedures.

Foreign researchers participate in several **national (compulsory) insurance schemes**, which provide cover for all people living or working in the Netherlands with a legal residence status.⁵⁵ These insurances are paid with tax money. When income tax is paid, part of it goes to these insurance schemes. However, when someone does not pay income tax, and (s)he is a resident, (s)he still will be covered for these schemes. Only when someone lives in the Netherlands temporarily and is not working there as an employee, they will fall outside these national insurance schemes.

Furthermore, there are **employee insurance schemes** which provide various forms of insurance cover for anyone employed in the Netherlands.⁵⁶ If someone is employed, (s)he will be insured for these employee insurances. The employer must pay contributions to these employee insurance schemes from his/her gross salary. Researchers that stay on the basis on an employment contract participate in the Dutch social security system and the organisation's occupation pension scheme. The contributions of the social security system and the company's pension scheme are partly paid by the employer and partly paid by the employee.⁵⁷

⁵⁴ A work permit is required because Dutch employers, when filling vacancies, are expected to give priority to Dutch or EU/EER nationals. They must demonstrate that they have tried to find a Dutch or EU/EER national (and were unsuccessful), before they can obtain a work permit for an individual from a non-priority country.

⁵⁵ There are schemes for elderly (AOW), surviving dependents (ANW), exceptional medical expenses (AWBZ), healthcare (ZVW) and children (AKW).

⁵⁶ These schemes provide cover for illness (ZV), occupational disability (WIA) and unemployment (WW).

⁵⁷ Researchers whose stay is based on a fellowship are often exempt from participating in Dutch social security and pension schemes.

To decide in which country one is participating in social security and to prevent that someone loses their accrued rights, many countries have laid down agreements on this subject. For the EU and EEA, the agreements are laid down in two regulations (Regulation 1408/71 and 574/72). The EU-regulations apply to all EU and EEA countries and in Switzerland. With other countries so-called bilateral social security treaties have been signed.⁵⁸ With a few of these countries also agreements have been made about health care insurance.

If Dutch researchers start working abroad, they can hardly avoid a break in their pensions. Pension agreements are rules between employers and employees, based on Civic Law. From an international point of view, they often lack a proper policy. Often, only national regulations remain. Each country, whether a member of the EU or not, has its own set of rulings. **Within the EU, the Netherlands is one of the few countries where specific rules towards international value transfers/ transition of accrued pension were deployed.**

Under conditions, Dutch pension and fiscal regulations allow **international pension transfers from abroad** to the Netherlands. For both the pension fund (ABP) and the Dutch Tax authorities the amount of the international value transfer is an important issue when a foreign pension insurer transfers pension accruals to ABP. The fund uses the incoming foreign capital to generate the equivalent of ABP pension eligibilities. With regard to international pension transfers, ABP has reached working agreements with the Tax authorities in the Netherlands.

When a foreign researcher leaves the Netherlands to carry on his/her career in another country, the ABP pension offers several possibilities. If the pension is small, one may opt for a lump sum payment.

Since 2001, a statutory regulation has been incorporated in the Income Tax Act which allows foreign employees, subject to deductions from their salaries, to receive under certain conditions a **tax-free reimbursement** from their employers (max. 30% of salary from present job). The reimbursement is intended to compensate for extra expenses incurred during a temporary stay outside the land of origin (extra-territorial costs). Application of the 30% rule can be requested from the tax inspector when a foreign employee is recruited by the University due to his/her special expertise. In practical terms, this means that an employee does not have to pay tax on 30% of his/her salary once this rule has been applied.⁵⁹

For foreign researchers that are going to work in the Netherlands, there are various **information sources**. For instance, the researcher's Mobility Portal for the Netherlands (<http://www.eracareers.nl/>) offers a comprehensive overview of the relevant issues and also gives links to other relevant websites. [ERA-MORE](#), a virtual European network of web portals focusing on researcher mobility, is seen as an effective resource for making vacancies accessible across Europe. The Mobility

⁵⁸ Social security treaties are signed with: Australia, Bosnia-Herzegovina, Canada, Chile, Cyprus (Turkish part), Israel, Cape Verde, Croatia, Macedonia, Morocco, New Zealand, Serbia and Montenegro, South-Korea, Tunisia, Turkey, The United States of America.

⁵⁹ This ruling has certain consequences in terms of pension and social security: employees who take advantage of the 30% rule can only accumulate pension on the remaining part of their salary. If the rule is approved after determining the annual salary ABP, in January of each year or the month of starting the job, the annual salary for that year will remain unaffected. Social security will be affected. The WW (unemployment insurance) premium which is deducted from the employee's salary may change, which means that a lower payment would be made in case of unemployment and/or inability to work.

Centers across Europe assist researchers and their families that migrate within Europe. They provide information on subsidies, job vacancies, training, intellectual property law, visa, housing, social security, language courses etc. The four [Dutch Mobility Centres](#) are Nuffic (Netherlands organisation for international cooperation in higher education), VSNU (Association of Universities), EG-Liaison (the centre of expertise for the European Framework Programme in the Netherlands), and the University of Tilburg. Universities, the pension fund ABP, the Immigration and Naturalisation Service (IND) and others offer relevant information for (prospective) researchers that want to come to the Netherlands.

4.1.2 Policies enhancing the attractiveness of research careers in Europe

In order to reach the number of researchers which the EU will need by 2010 to meet the Lisbon target, research careers in Europe have to become more attractive. Measures enhancing the attractiveness of researcher as occupation include: promoting women's involvement in scientific research; extending the opportunities for training and mobility in research; improving career prospects for researchers in the Community. The [European Charter for Researchers](#) sets the general principles and requirements that enable the frame for successful research performance, knowledge dissemination and technological development, and to the career development of researchers. Beyond its uptake, among the many potentially relevant policies, in this section we concentrate on policies affecting researchers' salaries and policies promoting women.

Uptake of the Charter of Researchers

The European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers were developed to help the EU Member States, employers, research financing bodies and researchers develop an appealing, open and sustainable European labour market for researchers. They ensure that selection and recruitment procedures are transparent and internationally comparable. Dutch research policy sees the Charter and Code of Conduct as providing a good basis for improving the career prospects of researchers. They must, however, be introduced and endorsed at the right level. The minister of OCW announced that he will draw the attention of the relevant parties to these documents and ask them how they intend to implement them. Trade and industry will also be involved in this dialogue, as the Charter and Code of Conduct also apply to companies as the employers.⁶⁰ While the Netherlands supports a proper analysis and monitoring of the trends on the European labour market of researchers (and careers) and advocates the continuation of the exchange of good examples of the introduction of the Charter and the Code of Conduct, the **idea to make these instruments legally enforceable, or reduce their voluntary and non legally binding nature, is explicitly rejected**. This would not fit in with the European aim of increased **autonomy for knowledge institutions**.⁶¹ Working conditions for researchers are seen as a matter for autonomous knowledge institutions (and companies) in the Member States, and not for the EU. Consequently, in the implementation of the Charter and Code of Conduct, the Dutch government is largely dependent on the universities and universities of applied

⁶⁰ OCW, Making the most of talented researchers

⁶¹ Government response to the green paper: the European Research Area: new perspectives. And 22112, no. 460, 22-8-2006.

sciences (“*hogescholen*”). The Association of Universities in the Netherlands (VSNU) has taken the lead in the Netherlands as regards drawing up its own Code of Conduct with regard to the recruitment of international researchers, based on the Charter and Code of Conduct, the European Guideline for the admission of researchers from third countries and the Code of Conduct for International Students in Dutch higher education.⁶²

Dutch policy emphasizes that getting rid of barriers to the mobility of both students and researchers within Europe is first and foremost **up to the Member States themselves**. However, it is considered very important that a European mobility strategy continues to support this process and that, where necessary, new impulses are provided, for example in the area of pensions and social security.

Furthermore, Dutch policy makers see no reason to be too pessimistic about the accessibility of academic positions. There is no evidence in the Netherlands that academic positions are often exclusively reserved for internal staff or people from the domestic labour market. In view of increasing international competition, knowledge institutions tend to be motivated to attract the best international researchers, including those from other world regions.

Dutch research policy sees the Charter and the Code of Conduct as part of a broader package of (possible) measures focused on improved career prospects for young talent, such as improved supervision and more space for PhD candidates resulting in, among other things, an [Innovation Research Incentive scheme](#) for top talents.⁶³

Only one Dutch research organisation signed the Charter for Researchers: the Maastricht Graduate School of Governance - Maastricht University.

Remuneration policies

As said before, Dutch universities have a large degree of autonomy. This means that HRM policy is primarily formulated at the level of the institution, with due consideration being given to the specific circumstances and the profile of the institution or faculty concerned.

The employers' organisation ([VSNU](#)) and the employees' organisations (trade unions) negotiate a Collective Labour Agreement (CAO),⁶⁴ in which, among other things, agreements are made on remuneration. In short, the employee receives a monthly salary (and structural salary increases), determined in accordance with the certain provisions and salary tables. If in the opinion of the employer the employee performs her duties satisfactorily, her salary shall be increased to the next amount in the salary grade.⁶⁵ If in the opinion of the employer the employee performs her duties very well or extremely well, her salary may be increased to a higher amount listed in the salary grade. She may also be granted a bonus for the period of one year, or, in special circumstances, for a longer period. The employer may also grant the employee a bonus for mobility, recruitment or retention reasons. This bonus shall be granted for a period that is agreed upon in advance. After the period referred to above has lapsed, the employer may again grant a bonus in a similar manner.

⁶² OCW, *Voortgangrapportage Wetenschapsbeleid* [Science Policy Progress Report] 2007, 29338, no. 55.

⁶³ OCW, 2005, Making the most of talented researchers.

⁶⁴ [Collective Labour Agreement Dutch Universities](#), 1 September 2007 to 1 March 2010.

⁶⁵ If in the opinion of the employer the employee does not perform his duties satisfactorily, no salary increase shall be given.

The employer determines the employee's job profile, job level and the salary grade with due observance of the rules of the university job classification system, "University Job Classification" (UFO).⁶⁶

One of the new elements is that parties of this CAO have agreed to experiment during this agreement period (2007-2010) with function based contracts concluded between the employer and the employee by mutual agreement.

Promotion of women

Despite the fact that more than half of the European student population is female, women hold less than 15% of full professorships in Europe. While the percentage of female university graduates and PhD holders has increased, the gender gap is not closing as rapidly as expected. Mobilisation of the potential of women is therefore seen as one important avenue to increase the number of researchers in the ERA. Dutch research policy also aims to have more women in academia.⁶⁷ While the European target is 25% women professors in 2010, the Netherlands aims for 15%.

For the period 2007-2011, existing policy and programmes to stimulate participation of women in academia, and especially in higher functions, are continued and intensified. OCW uses the following policy instruments:

- Universities and research institutes are asked to make diversity an integral part of their regular personnel and career policies.⁶⁸
- Via "policy-rich dialogue" between OCW and universities, universities have committed themselves to improve the representation of women in higher scientific and management functions. Universities have developed plans themselves to increase the number of women in these positions.
- Within the [Innovation Research Incentive scheme](#) extra money is made available to give grants to excellent women that were not awarded in the first instance (because lack of funds, not because insufficient quality).
- Financial support to the renewed [Aspasia](#) programme. Aspasia was launched in 1999 as a scheme to increase the number of women senior lecturers. In Aspasia new-style the procedure is as follows: Women wanting to qualify for promotion to senior lecturer or professor via an NWO programme can submit a proposal in the [Innovation Research Incentive scheme](#). The laureates will be recommended by NWO to the University Boards for promotion; the universities make the decision. To increase the number of women professors an additional €1m is allocated to the [Aspasia](#) programme (total budget is €2m/year).
- Financial support to the ESF-Equal project "participation as priority".
- Financial support for a study of gender bias in selection mechanisms for higher scientific functions.

⁶⁶ The job classification system UFO is a system for Dutch universities that has been introduced at 1 April 2003. UFO consists of over 100 job profiles, compact descriptions of most of the jobs that occur at Dutch universities, each split into scales according to degree of responsibility. The job profiles are generic as they are used in all fourteen universities.

⁶⁷ OCW, 2007, Strategic Agenda

⁶⁸ In the Collective Labour Agreement (cao) it is agreed that within the recruitment and selection policy, the employer (university) shall pursue an incentive policy aimed at women, the occupationally disabled, foreigners and other employee groups in a disadvantaged or otherwise vulnerable position.

- Financial support to the Dutch Network of Women Professors ([LNVH](#)).⁶⁹

The research council NWO also has a number of [policy initiatives](#) to improve the position of women in science. Age limits will be abolished (as much as possible). An extension clause is introduced (based on pregnancy, parenthood, part-time work in combination with care). A systematic data gathering of men/women scores in applications and awards is set up. Committees and boards will be composed in accordance with the man/woman distributions in academic populations. Women committee or board members are actively sought.

NWO has special programmes for women. In addition to Aspasia and the Innovational Research Incentives scheme, [MEERVOUD](#) and [FOm/v](#) can be mentioned. MEERVOUD (an acronym for More Women Researchers as University Lecturers) aims to help women postdocs become university lecturers by creating temporary (part-time) lecturer positions (or similar positions in institutes), with the added guarantee of obtaining a (different) scientific position within their research institution. The FOm/v incentives programme was launched in 1999 and consists of a broad range of measures by which women are encouraged to pursue a career in the physical sciences in the Netherlands. Among the incentives on offer are bridging subsidies for the award of permanent appointments to female physicists, individual postdoc appointments for women, grants for small-scale activities (travel, attendance at conferences), a publications prize, etc.

In the CAO several agreements have been made to reduce the negative effects of career breaks on women's research careers. A temporary employment contract, including any subsequent contracts, can last no more than six years. This maximum term, however, can be extended with the amount of maternity or parental leave taken if the employee requests this. A female employee who enjoys pre and post maternity leave by virtue of the Work and Care Act is entitled to full remuneration during this leave. The total term of the pre and post maternity leave is at least 16 weeks, at least 10 weeks of which are reserved for post maternity leave.⁷⁰ An employee who has a parental relationship with a child is entitled to parental leave on partial pay. If a parental relationship with more than one child takes effect from the same date, the employee is entitled to parental leave on partial pay for each child.

The employer is forbidden to terminate a permanent employment contract and prematurely terminate a fixed term employment contract during pregnancy or during the period in which the employee is on maternity leave and during a period of six weeks after resuming work or a period of incapacity for work as a result of the birth or the preceding pregnancy following maternity leave.

⁶⁹ The aim of the LNVH is to promote the proportionate representation of women within the university academic community. The LNVH tries to achieve this goal through: a. strengthening the ties among female full professors in the Netherlands, both within subject disciplines and interdisciplinary, and supporting any activity that is related to their position as professor; b. promoting the progression of capable women into higher academic positions within universities, as well as avoiding women leaving the profession; c. cooperation with organisations, in the field of academic research and teaching which have comparable aims; d. aiming for a numerically equivalent representation of female full professors in local and national committees and advisory bodies in the field of academic research and teaching.

⁷⁰ The actual term and the moment on which it is taken are regulated in the Work and Care Act.

4.2 Governing research infrastructures

The Netherlands has a very varied research infrastructure which consists of a multitude of installations, instruments, laboratories, research collections and other facilities. In a recent [study](#),⁷¹ **66 large scale research facilities** were identified which are funded in the Dutch public science system (excluding Dutch participations in large scale European facilities and facilities in the private sector). From the perspective of the large scale research facilities, the Netherlands has strengths in an advanced ICT infrastructure and e-science facilities; facilities in the domain of physics and materials science; research facilities for (bio)medical research; astronomical research facilities (there is also active participation in the international community); and a large and increasing number of research facilities for storage of, and access to, research data.

The Netherlands is co-founder and member of several large **inter-governmental research organisations** because membership creates synergies and critical mass. It also gives researchers access to advanced research facilities which could not be financed by one single country because of the size. The concentration of researchers within these research organisations gives significant scientific added value. The Netherlands participates in the European Organisation for Nuclear Research (CERN), European Molecular Biology Laboratory (EMBL), European Molecular Biology Conference (EMBC), International Thermonuclear Experimental Reactor (ITER), European Organisation for Astronomy Research (ESO) and European Space Agency (ESA).⁷²

Opportunities for facility sharing with neighbouring countries/regions are currently being explored. The Netherlands has signed Letters of Intent with [Flanders](#) in Belgium and [North Rhine-Westphalia](#) in Germany for cross-border collaboration in research and innovation. One of the three action lines is sharing of large facilities.⁷³ In the coming years, concrete collaborative projects will be developed.

The total gross value of the large scale research facilities in the Netherlands amounts to approximately €3.5b (excluding the intrinsic value of several (unique, historic) data collections). In the past thirty years, the **investments in research facilities have disappeared as a separate budget item** in the budgets of the various ministries. The investments have merged into the base funding and university block grants and in the budget items for programme and project-based funding. While the connection between research facilities and research programmes may have improved, policies and budgets for the research facilities have become somewhat invisible. This makes it difficult to assess how much is invested in research facilities. Coordination and planning of investments in research facilities are not made any easier as well. It is difficult to get an overview in what, where and how is realised. New large scale research facilities appear to have been established mainly via project and programme based funding initiatives. This means that several long term research facilities are being funded from **non-structural funding sources**. Temporary funding appears to be leading, with the block grant to knowledge institutes as complementary source. This may well lead to fragmentation and creates a risk for the financial sustainability of the Dutch research infrastructure.

⁷¹ Rathenau Instituut, 2008 Groot in 2008 - Momentopname van Grootchalige Onderzoeksfaciliteiten in de Nederlandse Wetenschap, Den Haag, SciSA rapport 0809 by E. Horlings and A. Versleijen.

⁷² OCW, Internationaliseringsagenda

⁷³ See <http://www.kennisbijdeburen.nl>.

Increasingly, it is recognised in Dutch research policy that excellent research facilities are crucially important for the quality and international competitiveness of Dutch scientific research.⁷⁴ For instance, the Innovation Platform stressed the importance of large scale research facilities in its report “[Knowledge ambition and research infrastructure](#)”⁷⁵ and asked for **more attention for structural investments** in such facilities (minimally €125m/year). As a response to the roadmap of the European Strategy Forum on Research Infrastructures ([ESFRI](#)) a national roadmap committee was set up in 2007.⁷⁶ Its main task was to advise the minister of OCW as to which large-scale research facilities the Netherlands should construct or participate in within an international context. The resulting [Netherlands’ Roadmap for Large-Scale Research Facilities](#) lists 25 large-scale research facilities. Immediate political and financial support is being requested for eight facilities that are also listed in the 2006/2008 European Roadmap. The Committee advises the Minister to order NWO to use the sum allocated to it for large-scale research facilities (€63m for the 2008-2012 period) specifically to finance these eight ESFRI facilities. In addition, an investment impulse of €78m from the FES is made available in 2009 for large scale research infrastructure.

4.3 Research organisations

From the 1980s onward the government started a process of enhancing the autonomy of universities. The government began to “steer from a distance”. In 1993 the Higher Education and Research Act (WHW) was adapted. Major changes in the WHW are among other things related to the introduction of the Bachelor-Master structure, quality assurance, funding and the internal governance structure of universities, real estate and HRM. This was followed in 1997 by another reform, the “**modernisation of the university governing structure**” (the MUB-Act) which introduced a new internal governance structure. The goals of the MUB were: (1) concentration of powers; (2) more transparency in authority relationships; (3) increasing the decisiveness and effectiveness of decision-making; (4) enhancing institutional autonomy; and (5) improving, or at least maintaining, significant participation of students and staff in decision-making.

Major changes consisted of:

- The Executive Board (*College van Bestuur*) is no longer appointed by the minister for OCW but by the **Supervisory Board** (*Raad van Toezicht*). The Supervisory Board is a new governing body, which consists of five lay (external) members that are appointed by the minister.⁷⁷ This Board oversees and appoints the members of the Executive Board – three members, including the rector – and is obliged to report to the minister on the university’s policies.
- The **position of executives** at the central and faculty level is **strengthened** vis-à-vis the position of the representative councils (the so-called university and

⁷⁴ OCW, Strategic agenda

⁷⁵ Innovation Platform, “Kennisambitie en researchinfrastructuur”, June 2005. The main conclusion is that large research facilities have an invaluable strategic importance for a dynamic Dutch knowledge economy and for the national innovation climate.

⁷⁶ Commissie Nationale Roadmap Grootschalige Onderzoeksfaciliteiten, Grootschalige onderzoeksfaciliteiten in de eerste Nederlandse Roadmap, 21 December 2007 (<http://www.minocw.nl/documenten/eerste%20deel%20roadmap%20def%20doc.%2047.pdf>)

⁷⁷ A member of the Supervisory Council cannot be an employee of a university (nor a member of Parliament).

faculty councils) through the integration of governance and management authorities. The representative co-decision-making councils have become representative advisory bodies of staff and students. In other words, the system of co-management is replaced by “participation” in institution management.

- A **vertical system of appointing executives** is introduced: the Supervisory Board appoints the members of the central Executive Board, the central Executive Board appoints the deans, and the deans appoint the programme directors. Thus, university leaders at all levels are appointed instead of being elected.⁷⁸ Often, they come from outside the university. Deans and scientific directors have to be professors.
- The “disciplinary research and teaching units” (*‘vakgroepen’*, cf. departments) are legally abolished and most of their **powers are allocated to the deans**.⁷⁹
- The former law on higher education (WHW) prescribed to a large degree the internal structure of universities. The MUB, still prescribing many governing aspects, has reduced the number of regulations. The amount of **freedom for institutions to design their organisational structures** has increased and may increase further in the foreseeable future.

At present the universities are responsible for the spending of their budget, which is provided by the government as a block grant. Employment terms have been decentralised from the ministry to the university. Universities select, appoint and employ professors and other personnel and design their education programs. At the national level, universities (represented by the VSNU) negotiate the collective labour agreements (CAO) with the trade unions.⁸⁰ At the level of the individual university there are also negotiations; they have some leeway to determine their own conditions. Today all academics and non-academics are university employees (rather than civil servants).

The autonomy of universities is accompanied by a number of legislative **obligations**, such as maintaining a system of quality assurance, rights of students and obligations towards students and accountability towards the government and society. This process of enhancing autonomy is still developing. Government policy is to give the institutions more freedom in order for them to work on their own (international) profiling.

Institutes can start new programmes, but degree awarding, funding of institutes and study finance for the students is only possible after accreditation is obtained and the ministry has judged positive on the macro efficiency of the programme (distribution of programmes in the Netherlands). Tuition fees are set by the government, with some exceptions (e.g. non-European students: Executive Board decides up to a certain level). There are experiments going on to allow tuition fee differentiation.

Institutes are allowed to gain additional income for tasks related to their main functions of teaching, research and knowledge valorisation.

⁷⁸ ‘Democratic aspects’ continue in that students and staff elect their representatives to councils at central and faculty level and the councils must be consulted when new executives are being appointed.

⁷⁹ The *vakgroepen* were regarded as bastions of conservatism and inertia with too much influence on the decision-making on the primary process.

⁸⁰ Collective Labour Agreement Dutch Universities, 1 September 2007 to 1 March 2010. Downloadable at the VSNU website <http://www.vsnu.nl/>.

The WHW gives universities the freedom to establish research institutes within or between faculties or between universities. **University research institutes** (“Centres of Excellence”) can get significant autonomy with scientific directors that have a strong position within the university.

OCW’s Strategic Agenda explicitly states that **an excellent research climate requires independence, transparent accountability and a satisfactory quality assessment**. Independence is a condition for universities (including institutes with a university affiliation) and the research institutes of the NWO and the Royal Netherlands Academy of Arts and Sciences (KNAW) in order to be able to perform pioneering and pure scientific research. The cabinet has opted to leave the details to the institutions in question. However, these institutions must account for their actions in a transparent manner and ensure that the quality of the research is clearly visible.

Block grants versus competitive funding

Public funding of university research mainly goes via a block grant (the “first flow”); and competitive funding by the national research council NWO (the “second flow”). The principle of this dual funding structure has not changed in the last decades.⁸¹ The organisation of the funding has changed, however, in an attempt to steer research and enhance the quality.

The block grant consists of six components. The largest component is for “strategic considerations”, the so-called SOC, which is based on historical performances of universities. Other components are based on the numbers of MA degrees, PhD degrees, participations in research schools and shares in the “second flow” (=competitive funding by NWO) and “third flow” (=contract research). With a decreasing share of the SOC, and increasing part of the block grant is allocated based on actual performances.

The latest initiative to make university research funding more performance based, was taken in 2008, when the minister of OCW decided to transfer €100m/year from the block grant to the Innovational Research Incentives scheme.

In addition, with the increase in programmatic modes of R&D funding, universities increasingly had to co-fund participation in the programmes from their block grants. Since the early 2000s, several investment impulses from the FES have been made to encourage research in areas of strategic interest for the Dutch economy – often through public-private partnerships. Because of the co-funding requirements, the autonomy of universities in allocating resources in line with their research priorities is reduced.

⁸¹ In the late 1990s the government unsuccessfully tried to increase the budget of the national research council NWO at the expense of the government’s block grant to the universities.

4.4 Opening up national research programmes

While most of the competitive research funding is for researchers affiliated with a Dutch university or (recognised) Dutch research institute, a small but increasing number of subsidies and research programmes aiming at talented scientists are [open for applications](#) by researchers affiliated with universities and institutes from abroad. The demands for admission may vary for each subsidy.⁸² In some cases, Dutch and foreign researchers staying abroad can submit a proposal for a research project to be carried out in the Netherlands (e.g. [Horizon](#) programme).

As the name indicates, an [ERA-NET](#) is first and foremost a network in which the research sponsors explore potential partners for cooperation and the research areas where this might take place. In some cases it remains a mere network. In other cases a number of partners develop a joint research programme with a common budget. Researchers from Europe can sign up via a Call for proposals at one of the participating agencies. The Netherlands participates in [46 ERA-NET projects](#). The national research council NWO coordinates about ten ERA-NETs in different fields, from chemistry to the humanities. NWO actively participates in a number of networks in the conviction that these ERA-NETs contribute to the quality of European research and eventually to strengthening Europe's position in the global knowledge economy. NWO favours ERA-NETs that have an added value for researchers at Dutch institutions. It involves fields where researchers (can) excel and where problems of compatibility and administrative burden need to be solved.

Researchers from the Netherlands have been very successful in the first round of the [European Research Council](#) (ERC). The ERC is similar to the Innovational Research Incentives Scheme of NWO, and this may have contributed to the [successful participation of Dutch scientists](#).

The Netherlands also plays an active role in several [Joint Technology Initiatives](#): embedded systems (ARTEMIS), nano-electronics (ENIAC), innovative medicines (IMI), aeronautics (Clean Sky). These JTIs overlap with one of the "key areas" in the Netherlands (i.e. High Tech Systems & Materials and Life Sciences & Health). In another "key area" (Food & Flowers) Dutch parties are also actively involved in the [European Technology Platform](#) (ETP) 'Food for Life'. In general, the innovation programmes in the key areas of the Dutch economy are increasingly used to improve the international/European embedding and positioning of the Dutch research and innovation system.

The innovation programmes in the "key areas" of the Dutch economy have been based on strengths and opportunities in the Dutch research and innovation system, but they all have a strong international character. The goals of the programmes can only be reached if there are collaborations with the best parties all over the world and if new services, processes and products can be marketed worldwide. In addition, activities are needed to attract foreign investments and talented knowledge workers that can support the vitality of the selected innovation ecosystems and the goals of

⁸² Currently, the following schemes are open for foreign researchers: ERA-NET, EUROCORES (a grant scheme of the ESF), the Innovational Research Incentives Scheme, NACCAP (a development orientated support and research programme, financed by the Dutch Ministry of Foreign Affairs), Population, Reproductive Health and Economic Development (PopDev), Process on a Chip (POAC), and Rubicon (a scheme to encourage talented doctorate graduates to gain experience at a top research institution outside the Netherlands (maximum of two years). (See http://www.nwo.nl/nwohome.nsf/pages/NWOA_6PAEPF_Eng)

the innovation programmes. Attractive international 'hotspots' cannot develop without international collaboration. Within the eight innovation programmes international strategies have been developed which include four main lines of action: R&D, trade promotion, acquisition of foreign investments and knowledge workers, and foresighting (e.g. development of strategic research agendas).

In general, the Dutch government is in favour of more coordination between national research programmes and the mutual opening up of national research programmes. The degree to which individual researchers have access to cross-border financing possibilities is closely related to the progress made with the coordination and mutual accessibility of national research and mobility programmes. The view in the Netherlands is that additional progress ought to be made in this area. In practice, however, this proves to be difficult. Some experience was gained in [cross-border collaborations](#) in R&D and innovation with Flanders and North Rhine-Westphalia. The Dutch government intends to intensify the collaboration with these neighbouring regions and develop concrete initiatives. Letters of Intent for more cross-border collaboration have been signed, including three action lines: facility sharing, network and cluster development, and enhanced policy coordination between governments. Until now, progress in cross-border collaboration in R&D and innovation and in policy coordination has been limited. A main reason is that the governance structures, the policy mixes and the funding modes are very different in the three countries/regions.

The Dutch government is in favour of more consultation at European level regarding the possibilities of, and hindrances to, the mutual opening up of national programmes for research projects in which partners from other European countries can participate. The Netherlands supports the European Commission as regards placing this subject on the agenda. In addition, the Netherlands is looking forward with interest to the proposals to be made for the application of Article 169 EC as a far-reaching form of coordination for national research programmes, which requires separate legislation via co-decision which will then lead to joint execution.⁸³

With regard to the portability of research grants, the national research council NWO is one of the 16 organisations from 14 European countries that has signed the [Money Follows Researcher](#) initiative. This is an initiative of [EUROHORCs](#). Researchers that have been awarded a personal subsidy from NWO (e.g. Innovational Research Incentives scheme) can make a request to continue their research abroad. The application will be assessed on a case by case basis.

4.5 National ERA-related policies – a summary

With regard to the opening up of the **labour market for researchers** Dutch policies aim to internationalise the labour market for researchers, but also look beyond Europe (e.g. Asia and the USA). The guiding principle is "quality" of education and research. Internationalisation requires quality and internationalisation enhances quality. Policies focus on increasing the mobility of Dutch students; stimulating a more international orientation of knowledge institutes; increasing of "brain circulation" (*i.e.* inward and outward mobility); and improving the attractiveness of the location climate for knowledge institutes (by creating an ambitious learning culture and an excellent research climate). Removing barriers for knowledge workers from abroad is one of the main policy issues. Dutch policy emphasizes that getting rid of barriers to the mobility of both students and researchers within Europe is first and foremost up

⁸³ Government response to the Green Paper: The European Research Area: New Perspectives.

to the Member States themselves. However, it is considered very important that a European mobility strategy continues to support this process and that, where necessary, new impulses are provided, for example in the area of pensions and social security. Via “policy-rich dialogue” with (autonomous) research institutions agreements are being concluded to strengthen academic HRM policy with a view to providing better career prospects for young researchers, women and ethnic minorities. The Netherlands also actively contributes to the ERA-MORE mobility portal. In addition, there are various grants that stimulate mobility.

With regard to **research infrastructures** it is increasingly recognised the high quality research facilities are an important element in the overall ambition to create an excellent research climate. While new investments in research facilities will be made in 2009 (e.g. from the FES), no structural funds are made available (yet). A Netherlands’ Roadmap for Large-Scale Research Facilities has been made with special attention for Dutch contributions to the ESFRI roadmap.

Since the mid-1990s, Dutch **universities** have a large degree of **autonomy**. At the same time, this autonomy is reduced by a range of project or programme-based instruments (which often require co-funding).

With regard to the **opening up of national research programmes**, the Dutch government is in favour of more coordination between national research programmes and the mutual opening up of national research programmes. An increasing (but still limited) number of research instruments are open for researchers affiliated to foreign research institutes. NWO is one of the 16 organisations from 14 European countries that has signed the Money Follows Researcher initiative. The Netherlands participates actively in ERA-NET projects. Dutch parties are also actively involved in several JTIs and ETPs. The innovation programmes in key areas of the Dutch economy increasingly get an international dimension. The goal is to become international ‘hotspots’ through international collaboration. Opportunities for more cross-border collaboration with neighbouring regions are being explored.

Table 9: Importance of the ERA pillars in the ERA policy mix and key characteristics

| | Short assessment of its importance in the ERA policy mix | Key characteristics of policies |
|--|--|---|
| Labour market for researchers | <ul style="list-style-type: none"> • Important, especially with regard to removing barriers to mobility | <ul style="list-style-type: none"> • The guiding principle is “quality” of education and research, because internationalisation requires quality and internationalisation enhances quality. • Policy focus on mobility of Dutch students; international orientation of knowledge institutes; “brain circulation”; and an ambitious learning culture and an excellent research climate. • Member States have responsibility for removing barriers for knowledge workers A EU mobility strategy should support this process • Better career prospects for young researchers, women and ethnic minorities via policy-rich dialogue with (autonomous) research institutions and via various instruments. • Various grants that stimulate international mobility. • Active contribution to the ERA-MORE mobility portal. |
| Governance of research infrastructures | <ul style="list-style-type: none"> • Increasingly important; the ESFRI roadmap has prompted the Netherlands to develop a national roadmap | <ul style="list-style-type: none"> • Development of national roadmap. • Recognition of importance of research infrastructures for the research climate in the Netherlands • Investment impulses from the FES, no structural funding. • Opportunities for facility sharing with neighbouring regions are being explored • Active international participation in CERN, EMBL, EMBC, ITER, ESO and ESA |
| Autonomy of research institutions | <ul style="list-style-type: none"> • Universities already have a large degree of autonomy since the mid-1990s. Autonomy is considered crucial in Dutch research policy. | <ul style="list-style-type: none"> • Universities have large degree of autonomy. Policy aims to give universities more freedom in order for them to work on their own (international) profiling. • Autonomy is accompanied by legislative obligations, such as maintaining a system of quality assurance, obligations towards students and accountability towards the government and society. • Transfer of €100m/yr from block grant to competitive funding of talented researchers as a policy effort to increase the dynamics in the research system |
| Opening up of national research programmes | <ul style="list-style-type: none"> • Increasingly important, but progress so far is limited. | <ul style="list-style-type: none"> • Dutch government is in favour of more coordination between national research programmes and the mutual opening up of national research programmes. • An increasing (but still limited) number of research instruments are open for researchers affiliated to foreign research institutes. • NWO has signed the Money Follows Researcher initiative. • The Netherlands participates actively in ERA-NET projects. • Dutch parties are also actively involved in several JTIs and ETPs. • The innovation programmes in key areas of the Dutch economy increasingly get an international dimension. The goal is to become international ‘hotspots’ through international collaboration. • Opportunities for more cross-border collaborations and mutual opening up of programmes are being explored. |

5 Conclusions and open questions

5.1 Policy mix towards national R&D investment goals

Main barriers to – in particular private – R&D investment are a sector structure characterised by a relatively low level of R&D intensity, relatively few innovative SMEs, a low degree of interaction between universities and SMEs, insufficient attractiveness of the Netherlands for foreign knowledge workers and R&D intensive firms, a (looming) shortage of graduates in S&T, a learning culture which is not ambitious enough and a research climate that insufficiently fosters excellence, and complex and fragmented governance structures (exemplified by a lacking integral strategy for knowledge and innovation policy).

The actual R&D investments in the Netherlands are still far removed from the target of 3% of GDP. Especially the business expenditures on R&D remain stagnant at ca. 1% of GDP, which is a long way from the official target of 2%. R&D expenditures by the government sector and the higher education sector show a declining trend. It is unlikely that the government will be able to increase the share of its budget appropriations or outlays for R&D substantially in the coming years, especially in view of the current economic recession. It can be concluded that the degree of compliance with national R&D investment targets is not high. Also because of the economic recession, R&D investments by the private sector cannot be expected to increase substantially in the near future. At March 25, 2009, the cabinet presented its [approach to the economic recession](#). Part of the package of measures is €900m extra for knowledge intensive activities (to strengthen the innovativeness of the Dutch economy).

A structural reason for insufficient progress towards the R&D investment targets is the relatively large share of the services sector in the Dutch sector structure. Not only is the services sector not as R&D intensive as the (high-tech) industry sector, but R&D in the services sector is not captured adequately with current measurement methods. Indeed, it could be doubted if it would be wise to strive for the 2% too rigorously and too quickly. Another main factor is that the Netherlands is not sufficiently attractive for foreign companies to perform R&D. Policy should probably focus more on improving the attractiveness of the Netherlands for R&D-intensive companies by having enough knowledge workers, world-class knowledge institutions and research facilities and a dynamism which encourages innovation. Efforts from both the public and public parties are needed. Extra (structural) investments in knowledge will be necessary. In the longer term, this would also change the Netherlands' sector structure.

While there are no major gaps in the portfolio of instruments used to increase R&D investments, more attention could be paid to Route 3 (Stimulating firms that do not perform R&D yet to perform R&D), Route 4 (Attracting R&D performing firms from abroad) and Route 6 (Increasing R&D in the public sector). To achieve national R&D investment goals, more R&D intensive firms, also from abroad, are needed. The “basic package” in the policy mix could focus more on stimulating firms that do not perform R&D yet to perform R&D. To further increase the attractiveness of the Netherlands as a location for R&D, additional efforts will remain necessary (also in terms of raising knowledge investments, e.g. in research infrastructure). There is evidence that the policy mix increasingly succeeds in raising the numbers of graduates in S&T, thus avoiding a shortage of HRST. With regard to improvement of

the governance structures, an interdepartmental “Knowledge & Innovation” programme department has been set up and an long-term strategy for knowledge investments has been developed. However, a more thorough policy streamlining and a more integral approach of the knowledge triangle would be helpful.

5.2 ERA-related policies

Importance of ERA and ERA-related policies in the overall national research policies and strategies

The European Research Area does not play a pivotal role in Dutch research policies and strategies. Internationalisation is an important element, but this is not restricted to Europe or Europeanisation. Quality is the leading notion in internationalisation policies: high quality (or research, education, facilities, etc.) is required to be competitive in international settings and to attract talented students, researchers and knowledge workers), and internationalisation contributes to raising the quality of higher education, research and science.

Dutch national policy does aim to increase mobility of researchers (“brain circulation”) and to improve career perspectives of researchers. The policy rationale is not explicitly linked to ERA, however, but rather to strengthening the Dutch education/research/innovation system (in an international context). The inward mobility of knowledge workers has been made easier, but further reduction of mobility barriers remains a challenge.

It is increasingly recognised in Dutch research policy that excellent research facilities are crucially important for the quality and international competitiveness of the Dutch research system. After a slow start, a Netherlands’ roadmap for large-scale facilities was developed in the context of the ESFRI roadmap. The European dimension in policies and strategies on research facilities is not very strong (yet).

Universities have a large degree of autonomy, also with respect to ERA-related issues. The development of stronger international profiles remains a challenge for Dutch (research) universities.

While most of the competitive research funding is for researchers affiliated with a Dutch university/research institute, a small but increasing number of subsidies and research programmes aimed at talented scientists are open for applications by researchers affiliated with universities/institutes from abroad (not limited to EU). The Netherlands participates actively in various ERA-NETs, JTIs, ETPs and other EU programmes.

In addition, internationalisation is also an increasingly important dimension in the innovation programmes in the key areas. These programmes have to result in international ‘hot spots’ that contribute to the attractiveness of the Netherlands for researchers, knowledge workers and R&D intensive companies. Again, the policy focus is on internationalisation rather than Europeanisation or ERA.

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List of Abbreviations

| | |
|--------|---|
| AWT | Advisory Council of Science and Technology Policy (<i>Adviesraad voor het Wetenschaps- en Technologiebeleid</i>) |
| BERD | Business Enterprise Expenditure on R&D |
| BuZa | Ministry of Foreign Affairs (<i>Ministerie van Buitenlandse Zaken</i>) |
| CBS | Statistics Netherlands (<i>Centraal Bureau voor de Statistiek</i>) |
| CEKI | Inter-ministry Committee on Economy, Knowledge and Innovation (<i>Commissie voor Economie, Kennis en Innovatie</i>) |
| EC | European Commission |
| ERA | European Research Area |
| EU | European Union |
| EZ | Ministry of Economic Affairs (<i>Ministerie van Economische Zaken</i>) |
| FES | Economic Structure Enhancement Fund (<i>Fonds Economische Structuurversterking</i>) |
| FIN | Ministry of Finance (<i>Ministerie van Financiën</i>) |
| FP | European Framework Programme for Research and Technology Development |
| GBAORD | Government Budget Appropriations or Outlays on R&D |
| GERD | Gross Domestic Expenditure on R&D |
| GOVERD | Government Intramural Expenditure on R&D |
| HEI | Higher education institutions |
| HERD | Higher Education Expenditure on R&D |
| HRST | Human Resources in Science and Technology |
| ICT | Information and Communication Technology |
| IP | Innovation Platform (<i>Innovatieplatform</i>) |
| K&I | <i>Interdepartmental “Knowledge & Innovation” programme</i> |

| | |
|------|---|
| | <i>department (Interdepartementale programmadirectie Kennis en Innovatie)</i> |
| KNAW | Royal Netherlands Academy of Arts and Sciences (<i>Koninklijke Nederlandse Akademie van Wetenschappen</i>) |
| NRP | National Reform Programme |
| NOWT | Netherlands Observatory of Science and Technology (<i>Nederlands Observatorium van Wetenschap en Technologie</i>) |
| NWO | Netherlands Organisation for Scientific Research |
| OCW | Ministry of Education, Culture and Science (<i>Ministerie van Onderwijs, Cultuur en Wetenschap</i>) |
| OECD | Organisation for Economic Co-operation and Development |
| R&D | Research and development |
| REKI | Council for Economy, Knowledge and Innovation (<i>Raad voor Economie, Kennis en Innovatie</i>) |
| SF | Structural Funds |
| S&T | Science and technology |
| S&E | Science and engineering |
| SME | Small and Medium Sized Enterprise |
| SZW | Ministry of Social Affairs and Employment (<i>Ministerie van Sociale Zaken en Werkgelegenheid</i>) |
| TTI | Leading Technology Institute (Technologisch Topinstituut) |

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Abstract

The main objective of the ERAWATCH Policy Mix Country reports 2009 is to characterise and assess in a structured manner the evolution of the national policy mixes in the perspective of the Lisbon goals, with a particular focus on the national R&D investments targets and on the realisation and better governance of the European Research Area. The reports were produced for all EU Member State and six Associated States to support the mutual learning process and the monitoring of Member and Associated States' efforts by DG-RTD in the context of the Lisbon Strategy and the European Research Area. The country reports 2009 build and extend on the analysis provided by analytical country reports 2008 and on a synthesis of information from the ERAWATCH Research Inventory and other important available information sources.

This report encompasses an analysis of the research system and policies in The Netherlands.

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