

RESEARCH, INNOVATION  
AND TECHNOLOGICAL  
PERFORMANCE IN GERMANY

COMMISSION OF EXPERTS  
FOR RESEARCH  
AND INNOVATION

EFI

# REPORT

2008 2009 2010

2011 2012 2013

2014 2015 2016

2017 2018 2019

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# SUMMARY

## CURRENT DEVELOPMENTS AND CHALLENGES

### A 1 PRIORITIES AND RECOMMENDATIONS FOR RESEARCH AND INNOVATION POLICIES OF THE NEXT LEGISLATIVE PERIOD

With the federal elections approaching in autumn 2013, the Expert Commission discusses major developments of the last years and identifies priority fields of action that should be addressed by the political stakeholders in the coming legislative period. The Expert Commission recommends:

- setting ambitious R&D and educational budget targets for the year 2020;
- enabling participation of the Federal Government in institutional financing of university research and education;
- applying a uniform financing key to non-university research institutions;
- expanding the Freedom of Science Act to tertiary education institutions;
- developing funding concepts for research following expiry of Higher Education Pact, Pact for Research and Innovation and Excellence Initiative;
- supporting innovation financing via R&D tax credits for companies;
- improving framework conditions for venture capital financing;
- further modernising patent and copyright systems;
- developing and implementing a systematic approach for R&I policy evaluation;
- focussing the High-Tech Strategy 2020;
- improving coordination of climate, energy and innovation policies;
- facilitating immigration of highly qualified foreigners;
- taking more advantage of the potential of women in business and research.

### A 2 OPEN ACCESS

The Expert Commission is convinced that the efficient organisation of the creation and distribution of research findings promotes the transfer of knowledge. Open access, i.e. free online access to research findings, increases competition and further taps the potential of the internet as a means of distributing knowledge. Thus the open access approach should be promoted. Yet this should also include protecting the interests of researchers involved. The development and expansion of open access journals and repositories should be further supported via public funding, with the aim of making open access publishing appealing to researchers. In the design of new structures it should be ensured that these are viable in the long term and as efficient as possible.

The Expert Commission recommends integrating a contractually bound, indispensable second publication right into the Copyright Act for academic writers whose publications originate in research activities that were largely financed by public resources. This right shall take effect within a reasonable period of time after initial publication. If scientists hold the right to second publication, they should be obliged in the case of publicly funded projects to publish their research findings online and free of charge upon expiry of the term.

## EU PATENT SYSTEM

A 3

The European Parliament's decision to introduce a unitary European patent and corresponding patent jurisdiction certainly improves on the previously existing European "bundle of patents". SMEs in particular are likely to benefit from these new regulations. Yet the Expert Commission considers it essential to further harmonise the EU patent system. In the medium term, all EU member states should fully replace the EPO bundle patent with the unitary European patent.

Fees should be designed attractively in order for the new system to be favoured over the old bundle patent system, while at the same time effectively limiting incentives for increased filing of low-quality patent applications. To maintain current high standards and to deal with an expected increase in the number of patent applications, the European Patent Office requires corresponding equipment and administrative support structures. The highest standards should be applied to the selection and specialised training of judges and to the ongoing support of patent courts, which are due to be established as part of the Central Division. Moreover, the expertise and current benefits of the German system need to be integrated into the new system.

## INTERNET AND IT START-UPS IN BERLIN

A 4

In recent years, Berlin has seen an increasing number of internet and IT start-ups financed by venture capital. This start-up boom owes more to social and cultural factors than to exceptionally favourable political-administrative framework conditions. With its thriving IT and internet scene, the city has a favourable competitive position within the innovative internet economy. This is important not only for the city of Berlin, but also for Germany as a business location. Berlin is an example of how the internet economy can generate significant value creation and employment opportunities within a short period of time. To foster the positive development of Germany's internet and IT industry, it is particularly important to improve framework conditions for financing growth of new enterprises.

## A 5 CROWDFUNDING

Crowdfunding is an innovative online-based form of financing. It offers new businesses and SMEs an attractive alternative to bank and venture capital financing. To date, crowdfunding is largely unaffected by existing prudential regulation.

Framework conditions for crowdfunding activities have been significantly improved in the United States in recent years. In view of this, Europe should also seek to harmonise its regulatory framework at a European level if it is to avoid losing ground. Furthermore, it will have to be clarified how, on the one hand, investors can be protected, and how, on the other hand, platform operators can be protected from fraudulent investors – without government intervention impeding the growth potential of crowdfunding markets in Germany and Europe. Strengthened investor protection could be achieved by introducing a cap on allowable investment amounts by individual private investors or by demanding explicit involvement of experienced and accredited investors in a financing project.

## A 6 EVALUATION OF INNOVATION POLICY MEASURES BASED ON RANDOMISED EXPERIMENTS

To increase the dynamics of R&D growth in Germany, a variety of policy measures are currently in place. Yet a systematic evaluation that complies with most recent scientific standards is still lacking. Randomised evaluations should therefore be included as one of the standard tools in the evaluation portfolio of public R&D funding in the future. A randomised introduction of policy measures for evaluation purposes is particularly useful in areas where a relatively large number of applicants is anticipated and where an oversubscription of funds can be expected due to limited budgets. The Expert Commission specifically recommends commencing an evaluation on the basis of a randomised allocation of funds in the context of the ZIM, a funding programme designed for supporting innovative SMEs. The findings of such evaluations could lead to considerable efficiency gains and thus to a much better use of scarce R&D subsidies. The randomised introduction of policy measures in the field of R&I policies is still rarely used in Europe. Here, German R&I policy could take a leading role.

## CORE TOPICS

### COORDINATING CLIMATE, ENERGY AND INNOVATION POLICIES

B 1

Germany pursues climate, energy and innovation policy objectives that overlap to some extent. In terms of regulation, these policies will have to be coordinated in order to create synergies and avoid counterproductive interactions.

Key instruments for climate and energy policies are the European Union Emissions Trading System (EU ETS) and Germany's Renewable Energy Sources Act (EEG). In addition, there are a number of instruments that aim to increase energy efficiency. Moreover, the field of climate and energy is one of the five requirement areas of the Federal Government's High-Tech Strategy 2020 and thus constitutes a German innovation policy priority matter. As regards the functioning and coordination of the existing climate, energy and innovation policy instruments, the Expert Commission sees deficits in terms of cost efficiency and a lack of incentives for developing new technologies. Against this background, the Expert Commission suggests the following measures:

- European emissions trading should be extended to cover all emission sources. Moreover, minimum prices for emission rights should be introduced.
- In the field of renewable energy, the Expert Commission agrees with the recommendations of the German Council of Economic Experts and the German Monopoly Commission to introduce Renewable Energy Certificates.
- An increase in energy efficiency should be implemented using a tradable energy saving ratio, flanked by additional measures in the area of buildings.
- The ratio of diffusion promotion and direct R&D funding in the field of renewable energies should be shifted in favour of R&D funding.
- Climate and energy policies should be coordinated through a national platform that would comprise not only relevant departments of the Federal Government, but also representatives of the *Länder* and relevant companies.

### INTERNATIONAL R&D LOCATIONS

B 2

The ongoing internationalisation of research and development (R&D) is leading to a new division of labour between highly developed industrialised countries and emerging economies. Large R&D intensive multinational enterprises base their decision on the location of R&D sites not only on the criteria of market attractiveness, and production and logistics costs, but also to an increasing extent on a country's innovative potential and its human capital endowment. Today, a growing number of German companies have R&D branches and manufacturing plants abroad. Overall, Germany's cross-border R&D flows are balanced and Germany continues to enjoy an excellent reputation as an investor, but also as a location for R&D activities.

Yet, when analysing the R&D priority areas of German companies abroad, and R&D spending by foreign companies in Germany, a high concentration on specific sectors of the manufacturing industries that are characterised by a medium R&D intensity becomes apparent. Existing strengths are thus further enhanced. This leads to a "competence trap": existing fields of competence are further expanded, while promising new fields of competence are only rarely tapped.

Therefore, Germany will have to give more attention to creating new areas in the field of cutting-edge technology and will also have to ensure that Germany remains attractive as an innovation location for foreign multinational enterprises in these areas. The Expert Commission thus recommends the following measures:

- The Federal Government should base its educational policies and its basic research on a broad approach to prepare Germany for the technological developments of the future. At the same time, effective technology transfer is required to lay the foundations for the future utilisation of newly created knowledge.
- To ensure that R&D activities in the field of cutting-edge technology are conducted in Germany, it is necessary to keep publicly funded applied research in the country. At the same time it is imperative to attract additional R&D from abroad. Restraint should be exercised in the public funding of applied research activities by German non-university research institutions abroad.
- Germany's current locational tax drawbacks will have to be amended and R&D tax credits will have to be introduced if Germany is not to fall behind in international competition.
- Decision makers from politics and science should engage in a regular, systematic dialogue with research-intensive companies from abroad. The topic of international exchange should be monitored and developed by existing committees such as the Innovation Dialogue, the Science and Industry Research Union, as well as regular intergovernmental committees and bilateral innovation policy platforms.

### B 3 INNOVATION-ORIENTED PUBLIC PROCUREMENT

In the European Union and in Germany, proposals for designing innovation-oriented procurement as an innovation-promoting policy instrument are being discussed. The interest in the effects of innovation-oriented procurement is largely driven by the considerable volume of public demand. In the view of the Expert Commission, Germany is not sufficiently exploiting the potential of innovation-oriented procurement. It is too often the case that public procurement makes use of established solutions or solutions with minor innovative potential, thereby disadvantaging or inhibiting the development and distribution of innovative products and services by German firms. The Expert Commission therefore recommends the following:

- The Federal Government should support measures initiated by the EU Commission to promote innovation-oriented procurement, particularly the initiatives for the implementation of Pre-Commercial Procurement (PCP) and the renewal of the directive on public procurement in Europe. Yet, in the implementation of this reform, the Federal Government must take care that these measures do not lead to a permanent restriction of competition.
- Public procurement in Germany is highly fragmented and should be coordinated more closely. Furthermore, it is important to raise awareness among procurers about the opportunities of innovation-oriented procurement. The Expert Commission therefore welcomes the creation of a competence centre that offers advice and assistance to public procurers in the field of procurement.
- It is essential to collect and publish relevant data in order to monitor the effectiveness of measures promoting innovation-oriented public procurement and to take corrective action if necessary. The Alliance for Sustainable Procurement, initiated by the Federal

Government, should therefore develop explicit recommendations for an improved statistical collection of data relating to innovation-oriented procurement.

- The Federal Government’s planned projects for the promotion of innovation-oriented procurement should be monitored and evaluated from the start.

## TAKING MORE ADVANTAGE OF THE POTENTIAL OF WOMEN IN THE RESEARCH AND INNOVATION SYSTEM

B 4

A shortage of skilled workers, particularly in the MINT professions, is increasingly becoming a bottleneck for Germany’s innovative power and locational competitiveness. Skills and innovation potentials that have been previously underutilised must therefore be better utilised in the future. This applies to women in MINT subjects and women in senior positions in the academic and business world. Although today more women than men earn an academic degree, this success is not continued on the labour market. Instead, Germany loses the potential of the ever-growing number of well-educated women in their transition to the labour market and in their occupational progression – in fact: the higher the career level, the more women are lost. Also, when compared with other countries, too few women can be convinced to study and work in the field of engineering in Germany.

In order to make better use of the innovative potential of women, the Expert Commission sees considerable need for action:

- Schools should put particular emphasis on fostering girls’ interest and enthusiasm for mathematical and technical issues.
- Combining work and family must be facilitated by expanding childcare facilities. In the long run, this will create the necessary incentives for making better use of the innovation potential of women in general, and women in engineering professions in particular.
- At the same time, companies and research institutions have to strengthen their efforts in order to ensure greater representation of women in leading positions. Gender-biased recruitment and selection processes must be detected and avoided – in the best interest of the companies and research institutions themselves.
- Ultimately, the Expert Commission also considers the introduction of quotas for leading positions in academia and business as an appropriate means of accelerating the transition towards greater gender equality.



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