

RESEARCH, INNOVATION
AND TECHNOLOGICAL
PERFORMANCE IN GERMANY

COMMISSION OF EXPERTS
FOR RESEARCH
AND INNOVATION

EFI

REPORT

2018 2019 2020

2021 2022 2023

2024 2025 2026

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Executive summary

A Current developments and challenges

A 1 Central guidelines for R&I policy in the new legislative period

In the new legislative period, German R&I policy must be systematically developed further to meet the challenges it faces, which have continued to grow in recent years. The target should be to spend 3.5 percent of gross domestic product on R&D by the year 2025.

Better use must be made of the opportunities offered by digitization. The skills needed in the use of digital technologies should be widely promoted in all areas of education and training. Ambitious broadband-expansion targets well in excess of 50 Mbit/s must be laid down and implemented.

The quality of services provided by public authorities for citizens and businesses should be improved by expanding e-government. In addition, start-ups and other companies must be given access to public-sector data in order to open up new potential sources of value creation.

In the new legislative period, tax incentives for R&D activities should finally be introduced and focused on SMEs. For the practical implementation of tax incentives for R&D activities, the Commission of Experts recommends a tax credit for R&D personnel expenditure that can be offset against payroll tax.

A 2 Sustainability and innovation policy

The concept of sustainability encompasses economic, social and ecological dimensions. In its 2030 Agenda, the United Nations agreed on 17 sustainability goals with a total of 169 subtargets, to which the Federal Government has also committed itself. Innovations can make an important contribution to achieving the sustainability goals. Since it is unclear how to deal with conflicting goals, sustainability assessment represents an overarching socio-political challenge.

Innovations can lead to conflicts between different sustainability goals. Such conflicts of objectives should be cushioned by coordinating with other policy areas such as labour-market or environmental policy. In addition to supporting basic research, R&I policy must be able to focus on funding R&I activities that are relevant to the great societal challenges, keeping the door open to all technologies in this context.

The careful involvement of different social groups to identify and confirm important societal challenges is useful as a guideline for R&I policy.

A 3 Universities of applied sciences in transition

Fifty years ago, universities of applied sciences (UASs; originally called Fachhochschulen (FHs), today often referred to as Hochschulen für angewandte Wissenschaften (HAWs)), were established as an independent type of tertiary education institution. UASs are one important pillar of the German higher-education system and have made a significant contribution to the further development of the innovation system. Their specific tasks include, in particular, application-oriented teaching and application-oriented research. Furthermore, UASs offer important career opportunities for graduates of apprenticeship training.

In the course of educational expansion, the percentage of students attending UASs has risen. In the future, an even larger percentage of Bachelor students should study at UASs. UASs need better basic financing to ensure that they can carry out their tasks.

The number of doctoral degrees granted in cooperation between UASs and universities is increasing. Different organizational models are used in this context. In the Commission of Experts' view, experience gained with these models should be used to strengthen cooperative doctoral studies in the future. However, the actual right to grant doctoral degrees should remain exclusively with the universities.

A 4 Digital education

In the course of digitization, skills in software and algorithm development, and specialists with key forms of digital expertise, have become important prerequisites for productivity growth and innovation in both established and new industries.

Key digital skills should already be taught in primary schools nationwide. Schools need excellent IT equipment and facilities, as well as teachers who can communicate these skills. The Digital Pact for Schools (DigitalPakt Schule) must therefore be urgently implemented and given priority in financial planning.

In the dual system of vocational education and training, new professions should be developed in the IT field that reflect requirements. In addition, IT skills should become a fixed and integral part of all vocational training.

Tertiary education institutions across all disciplines should also be encouraged to teach programming skills and knowledge of software and web development, as well as data sciences and methods of machine learning. In this context, active use should be made of the new possibilities offered by Article 91b of the Basic Law.

B Core topics 2018

B 1 Long-term developments in productivity and innovation

The growth rate in overall economic productivity has been slowing down in many countries, including Germany, for several decades and increasingly since the mid-1990s. While some experts have expressed concern that this slowdown in productivity growth reflects a universal exhaustion of technological potential and innovative ideas, others blame delays in the diffusion process of digitalization.

The fact that the innovator rate has been decreasing in Germany and most other European industrialized countries for about 20 years is seen by some observers as an indication that, parallel to the slowdown in productivity growth, innovation activity, an important driver of productivity, is also declining. However, the decline in the innovator rate could also be due to a concentration of innovative activities on fewer and fewer economic actors operating in more concentrated markets with high barriers to market entry. It is currently too early to draw any final conclusions on whether innovation activities are in fact slowing down or simply becoming more concentrated. Further research and, above all, better indicators are needed to assess this.

The Commission of Experts emphasizes that ensuring long-term productivity growth also requires the use of radical innovations and, in particular, their rapid diffusion. Primarily due to its power to design the regulatory environment, the Federal Government has important influence here, which it should use.

- Basic research is an important source of radical innovations and should be strengthened. It should not be neglected in favour of applied research, even when the latter promises short-term contributions to innovation and growth.
- Innovations can only have a large-scale impact on productivity if they find widespread application. It is therefore important to take appropriate measures to support the diffusion of radical innovations and their follow-on innovations. This currently applies in particular to the digital transformation, which is yet to be universally implemented.
- The regulatory environment must ensure that the economic actors can agilely make use of new technological opportunities, and generate and market radical innovations. This requires a suitable regulatory framework, e.g. in competition law, to give new actors barrier-free market access and prevent the emergence of dominant companies; such conditions are also needed in the financial sector to support the founding and growth of innovative young companies.

B 2 Challenges of European R&I policy

The EU's R&I policy is a relatively young policy area that is characterized by the formulation of very ambitious goals. In the past, the EU has fallen short of these goals, in some cases by a long way. The Commission of Experts is concerned that the EU's repeated marked failure to meet self-proclaimed objectives will undermine the credibility of European R&I policy in the medium term.

The structures of European R&I policy are very complex, and responsibilities fragmented. The Commission of Experts therefore regards the consolidation and simplification of European R&I structures as a key task of national and European policy. This task must take precedence over the creation of new institutions and the development of additional funding instruments.

The current challenges for European R&I policy lie in overcoming the so-called innovation divide, while simultaneously ensuring the promotion of excellence in research in Europe, justifying the creation of the European Innovation Council (EIC), and coping with Brexit.

- Horizon 2020 is primarily geared to the promotion of excellence in research. This orientation must be maintained in the design of the 9th Framework Programme for Research and Innovation and should not be diluted by the inclusion of additional elements.
- At the same time, a governance structure must be created which ensures that the funds earmarked in the European Structural and Investment Funds for the promotion of research and innovation are used by the national governments in a more goal-oriented and effective way than in the past.
- The Commission of Experts is critical of the idea of setting up an EIC on the basis of the current pilot project, since its orientation is insufficiently substantiated and its integration into the institutional structure of European R&I policy unclear.
- The Commission of Experts advocates the establishment of an agency for radical innovations. However, it is sceptical about the idea of creating a new EU institution for the purpose. The Commission of Experts therefore recommends developing an institution for the promotion of radical innovations outside EU structures.
- In view of the importance of the United Kingdom as one of the most capable R&I systems in Europe, the Commission of Experts urgently advises forging the closest links possible between the United Kingdom and the European research landscape, as is currently the case with Norway.

B 3 Autonomous systems

The potential economic and societal benefits of autonomous systems are considerable. Their use can help improve road safety, support people in work processes, make life more pleasant for the individual, and improve societal participation. Autonomous systems independently solve complex tasks with the help of software and methods of artificial intelligence (AI). They learn on the basis of data, and are thus able to act without human intervention even in unfamiliar situations. However, at present the use of autonomous systems is still in its infancy in many fields.

Germany is in a good starting position for reaping the potential added value and benefits of autonomous systems. For example, the country has an internationally competitive basis for the development of autonomous vehicles. In other areas of application, however, Germany is lagging behind the market leaders in the development of autonomous systems. Furthermore, it is becoming apparent that other countries are giving high priority to AI research and industrial policy. In addition to designing a regulatory framework, therefore, German policy-makers must step up their funding of research in the field of both autonomous systems and AI.

- The Commission of Experts recommends setting up a Bundestag Committee of Inquiry (Enquete-Kommission) on “Autonomous Systems and Artificial Intelligence” to intensively examine questions of ethics, data protection, data privacy and competition.
- The Commission of Experts calls for the development of a national strategy for AI with the aim of boosting Germany’s scientific and technological competitiveness.
- The Federal Government must ensure that companies do not use data to build barriers to market entry that will obstruct the competitive process in the long term. In this case, data must be treated by the competition authorities as essential facilities.

- The fact that funding policy has hitherto been strongly focused on current strengths of the German economy could prove to be an obstacle to the development of new areas of application. The Commission of Experts advises incorporating all application fields of autonomous systems into the funding.
- The Commission of Experts calls on the Federal Government to actively accompany and support the process initiated by the European Commission for the creation of a European internal market for data.

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