

Research at Universities in Germany



Dr. Daniel Schiller¹

Abstract

In Germany, all universities have the task to carry out both research and teaching. However, due to a lack of differentiation and competition combined with chronic underfunding, research quality and attractiveness of the research environment at most universities did not keep up with public research institutes in Germany and lost ground at the global scale. This article discusses reasons for the state of university research in Germany and assesses the strategies that have been applied to improve research at German universities recently, in particular the Excellence Initiative.

Keywords: higher education system, research funding, excellence initiative, Germany.

Overview of public research in Germany

The German public research system consists of approximately 400 public higher education institutions, thereof 100 full universities, 200 universities of applied sciences (Fachhochschulen), and 100 other universities, e.g. universities of fine arts². All universities have the task to conduct both teaching and research, but with a distinct division of labour that is specific for the German higher education system. Teaching and research

are of same importance at all full universities; they are conducting basic and applied research and are allowed to grant doctoral degrees. Universities of applied sciences focus mainly on teaching and to a lesser degree on research with a focus on applied sciences. This division of labour allowed German higher education to meet the different requirements for university graduates in industry, science, and government occupations. More recently, there are discussions to strengthen research at universities of applied sciences and to allow them to grant doctoral degrees³. The remainder of this paper focuses on full universities because of their stronger focus on research.

In addition to universities, a major part of public research activities is carried out by public research institutes independently from universities. The largest institutes are part of four research organizations, i.e. Max Planck Gesellschaft, Fraunhofer Gesellschaft, Helmholtz Association, and Leibniz Association. While Max Planck and Helmholtz Institutes focus on basic research, Fraunhofer Institutes carry out applied research often in cooperation with industry².

Education policy is almost exclusively a responsibility of the German *Länder* (federal states) since the reform of federalism in Germany in 2006, while the public research institutes mentioned above receive their funding jointly from the states and the federal government. Each of the sixteen state governments is providing institutional funding to the universities within their jurisdiction. The federal government is only allowed to provide additional funding for research on a temporary base. This situation is now viewed as problematic by many university administrators because of the limited ability of many federal states to provide sufficient funding to universities and the disadvantages for universities in providing an attractive environment for research in comparison to public research institutes which receive additional funding from the federal government. Thus, the sole responsibility of the *Länder* for university education is at the moment heavily debated and it is quite likely that the federal

¹ Senior Researcher, Lower Saxony Institute for Economic Research (NIW), Hannover, Germany. Contact: schiller@niw.de

² BMBF, 2012: Federal Report on Research and Innovation. Federal Ministry of Education and Research. Berlin.

³ Wissenschaftsrat (2010): Empfehlungen zur Rolle der Fachhochschulen im Hochschulsystem. Berlin.

government will be allowed to provide funding directly to the universities on a permanent basis in the coming years.

Main features of research at German universities

The German university system is characterised by the Humboldtian ideal which includes, on the one hand, the unity of research and teaching and, on the other hand, a considerable degree of academic freedom for the individual scientist. The unity of research and teaching is based on the assumption that the quality of teaching is increased if the teachers are teaching contents and methods which they apply themselves in state-of-the-art research projects. Therefore, high quality research at universities is the prerequisite for high quality teaching. This argumentation is behind the need to strengthen research at German universities.

While all full universities in Germany are research universities by definition and the official mission of almost all academic staff comprises research and teaching to a similar degree, several issues related to research at German universities put this definition into question. These issues can be summarised by a lack of differentiation and competition¹.

The claim that all scientists in all disciplines at each university should focus on research and teaching in a similar way tends to ignore two important facts: First, people are different. Some are better researchers, while some are better teachers. Second, research quality is positively affected if a critical mass of excellent researchers works together in one place. Therefore, a certain differentiation among individuals and among departments within universities might improve the overall research quality, while the unity of research and teaching remains intact. However, the lack of competition within the German university systems impedes the identification of the best research groups in each discipline and a higher degree of differentiation². In addition, existing differences in terms of quality among universities and disciplines are not made transparent for outsiders because there is no research assessment system which compares the performance within a discipline across all universities in Germany. Comparative assessments are only carried out among universities within the same federal state or in an informal way by think tanks and newspapers³.

Funding for universities and for faculties and institutes within universities is still mainly input-oriented and not based on performance criteria.

Some outcome-oriented, competitive elements have complemented input-oriented indicators recently, but they play a marginal role at most universities and faculties. Funding for research and teaching is largely paid from public taxes, while less than ten percent of the expenditures for higher education are from private sources. This is a very low figure by international comparison. The share of income distributed through performance-based funding models does not exceed five percent on average⁴.

Recently, several measures to modernise the German university system and to make it more efficient have been discussed⁵. Besides a larger degree of competition and differentiation as mentioned above, the chronic underfunding has to come to an end and the administrative system needs to be reformed, e.g. by deregulating the state-run bureaucracy and by introducing professional science management. A considerable degree of academic freedom for the individual scientist is deemed to be an important requirement for unleashing their creative potential. But, at the same time, an incentive system based on outcome indicators and performance is needed to ensure that a system that is strongly based on intrinsic motivation produces outcomes that are efficient for the university as an organisation and for society as the ultimate stakeholder of university research.

The need for these reforms is further substantiated by the assessment of the research environment at German universities by foreign scientists in Germany and by German scientists who moved abroad⁶. Despite the fact that the quality of research at many university departments is still very good and some are able to achieve an excellent performance at the international scale, the attractiveness for researchers is reduced due to several reasons. Career options for junior scientists are limited because of the lack of permanent or tenure-track positions. Researchers have to deal with a lot of administrative tasks because of the lack of administrative staff and professional science management. Faculties and institutes are organised hierarchically and independent research of junior scientists faces barriers. As a result, Germany is often not the first choice for foreign researchers, particularly for junior researchers⁷. However, the attractiveness among senior researchers who can apply directly for permanent positions as a professor is higher.

¹ Liefner, I. (2003): 469-490. AND Pritchard, R. (2006), pp. 90-112. AND Schiller, D. (2011), pp. 109-121.

² Schiller, D. (2011), pp. 109-121.

³ Ibid.

⁴ Liefner, I. (2003), pp. 469-490. AND Liefner, I., L. Schätzl and T. Schröder (2004), pp. 23-38.

⁵ Pritchard, R. (2006), pp. 90-112.

⁶ Schiller, D. & J. Revilla Diez (2012), pp. 1319-1332. AND Schiller, D. & J. Revilla Diez (2010), pp. 275-294.

⁷ DAAD and DZHW (2014).

Research funding in Germany

Research is a mission of all universities in Germany, however the funding provided to carry out research projects from the institutional budget by the state governments is low. Research at universities, therefore, depends largely on external research grant. The main agency which provides external research grants on a competitive basis in all fields of science and humanities is the German Research Foundation (DFG – Deutsche Forschungsgemeinschaft). The DFG is jointly funded by the federal government (67%) and by the states (33%) and realised a growth of its budget during recent years. DFG is funding approx. 30,000 projects with a total volume of €2.5 billion per year¹. The voting system and other procedural regulations of the DFG guarantee science-driven decisions. The research funding model can be considered as an example of good practice at the international level.

Decisions by DFG about research projects are science-driven and the procedures are to a large degree based on self-organisation. The decisions about research projects are prepared by review boards which consist of elected members from the respective discipline based on scientific peer review. In addition, scientific members have a majority in the main decision-making body, the Joint Committee.

DFG is providing most of its research grants within different lines of funding which comprise individual grants programmes (33% of funding), coordinated programmes (41%), and the excellence initiative (17%, see next section). The most important individual funding programmes are individual grants for a specific project and a limited number of researchers (29%), individual scholarships (3%) for junior scientists (Emmy Noether Programme) and senior scientists (Heisenberg Programme). Among the coordinated programmes, collaborative research centres are the main funding line (22%). In this programme, outstanding research programmes at universities are supported for a period of up to twelve years. Research units (5%) are funded for a period of up to six years and comprise a limited number of researchers who work on a clearly structured project which extends the size and duration of an individual research grant. Priority programmes (7%) foster the cooperation of researchers from all over Germany on a specific topic which is given a funding priority by DFG. Research Training Groups (5%) support the qualification of doctoral researchers within the framework of a focused research programme and a structured training strategy for a period of up to nine years².

The distribution of DFG grants among universities and disciplines is well documented and provides some information on their performance. Even though research funding from DFG is only an input criteria, it can be used as an indicator for the quality of research because it is provided based on a peer review process and requires previously acquired excellence in the field of research. 88% of the awards granted between 2008 and 2010 are concentrated among 40 universities, while the top ten recipients receive 37% of the funding. Among the top recipients of DFG awards are RWTH Aachen, LMU Munich, FU Berlin, TU Munich, Heidelberg University. Each of these five universities received about €250 million DFG funding over the three-year period³.

Besides the DFG, other important funding sources for research at universities are private foundations (the largest is Volkswagen Foundation with a funding volume of €160 million per year), the Federal Ministry of Education and Research (BMBF), and the European Union, e.g. Horizon 2020. In addition, income for carrying out research projects is generated from collaboration with industry⁴.

The research policy of BMBF has been aligned to the principles of the so-called High-Tech Strategy (HTS) with the aim to ensure that Germany becomes a pioneer in terms of solving global challenges and providing answers to urgent questions posed by the 21st century. The HTS is the first national innovation strategy on a comprehensive basis. It summarises existing scientific-technical competences and aims to expand them. Key areas of support comprise five fields: climate/energy, health/nutrition, mobility, security, and communication⁵. While the HTS strengthens the mission-oriented nature of research funding by BMBF and has a strong impact on applied research projects, research funding by DFG remains curiosity-driven and project are assessed based on the scientific quality of proposals⁶. A large part of BMBF's annual budget for R&D projects (€3.4 billion) is allocated to the private sector⁷. Therefore, DFG is still the most important funding source for research at universities.

Universities in Germany receive a comparatively high amount of income from technology transfer⁶. About 25% of external grants are from industry. Among the full universities, technical universities are relatively more intensely cooperating with industry. Universities of applied sciences also

¹ DFG (2013a).

² DFG (2013b).

³ Ibid.

⁴ BMBF, 2012.

⁵ Ibid.

⁶ Schiller, D. (2011), pp. 109-121.

⁷ BMBF, 2012.

cooperate more intensely with industry than full universities on average¹. University-industry linkages in Germany mainly comprise short-term projects, e.g. consulting and contract research, to solve specific problems in the firm. Most transfer activities are based on direct, often informal contacts between researchers at universities and industry staff. Long-term, open-ended collaborations are often hindered by bureaucratic barriers to the creation of organisational models for collaborative research, e.g. joint research centres, public-private-partnerships¹. Up to now, income from research projects with industry does not rank very high in performance-based funding formulas².

Overall, the research funding landscape is well developed in Germany. However, competition for research grants has also increased because of the limited resources for research provided by the universities themselves. Therefore, larger increases of the budgets of research funding organisations are necessary to compensate for the chronic underfunding of universities from the state budgets. While the budget of the DFG grew during the last years³, foundations are suffering from the low interest rates received from their endowments and the research budget of the EU has been reduced as a result of the financial crisis. An often mentioned critique of the growing importance of external research grants is that these grants favour mainstream topics, less risky research designs, and increase barriers for junior scientists who do not yet possess a strong record in their subject area.

The German Excellence Initiative

Quality differences between German universities have traditionally been small, ignored or minimised. Differences in quality and scope were not apparent to outsiders, but were at best known to the scientific community. The Excellence Initiative broke with this assumption of equality when it was formally publicised in 2005. It represented a paradigm shift in the German university system by introducing a new element of competition between institutions that did not exist before. In contrast to 'quality', the term 'excellence' was deliberately chosen to signal the aim of creating a few outstanding units.

The aim of the Excellence Initiative is to strengthen cutting-edge research in Germany and to improve its international competitiveness. In its first phase (2006 to 2012) €1.9 billion were made available jointly by the federal and the state governments. In a second phase, €2.7 billion are provided for a period from 2012 to

2017. Funding was provided on a competitive base with an international review process. The projects were selected by a committee made up of the German Science Foundation, the German Council of Science and Humanities, and the Federal and State Ministers of Science and Research. The main rationale for decisions was scientific excellence which was documented by the fact that scientific members had a majority over political members in the committee⁴.

The excellence initiative comprises three lines of funding: *Graduate Schools* to promote young scientists (15% of the funding in the second phase), *Clusters of Excellence* to promote cutting-edge research (57%), *Institutional Strategies* in which universities had to present a strategic concept to advance their development as a whole (29%), informally also called *elite universities*. While the first funding lines have some similarity with the Research Training Groups and the Collaborative Research Centres of DFG, the funding of institutional strategies is unique to the German university system⁵.

Institutional strategies of six universities are funded during the first and second phase of the Excellence Initiative from 2006 to 2017 (LMU Munich, TU Munich, RWTH Aachen, Heidelberg University, FU Berlin, and Konstanz University), while three universities were only funded in the first phase (Goettingen University, Freiburg University, and Karlsruhe Institute of Technology) and the institutional strategies of five universities are only funded since 2012 (HU Berlin, Cologne University, Tuebingen University, TU Dresden, Bremen University)⁵.

The regional distribution of universities with funding for their institutional strategies shows that the funding decisions were not based on an equal distribution among the federal states. The fourteen universities that have been funded in either the first or the second phase are located in seven out of sixteen federal states. Five universities are located in Baden-Wuerttemberg, two universities each in Bavaria, North Rhine-Westphalia, and Berlin, and one each in Bremen, Saxony, and Lower Saxony. The concentration of funding from the other two lines is similar⁵.

The Excellence Initiative is expected to have a positive impact on the development of research at German universities in several ways⁶. *First*, differentiation of universities is strengthened. Excellent research clusters at universities are able to increase their international competitiveness and become more visible. *Second*, the increased

¹ Schiller, D. (2011), pp. 109-121.

² Liefner, I., L. Schätzl and T. Schröder (2004), pp. 23-38.

³ DFG (2013a).

⁴ DFG (2013a): AND Schiller, D. (2011), pp. 109-121.

⁵ DFG (2013a).

⁶ Schiller, D. (2011), pp. 109-121.

visibility and the better conditions for carrying out research within programmes funded by the Excellence Initiative have positive effects on the possibility to attract scientists from abroad. *Third*, the need to form clusters of researchers from several disciplines and to develop university-wide strategies improves the cooperation across disciplinary borders. *Fourth*, a successful proposal for funding of an institutional strategy might induce additional funding from other sources. *Fifth*, regional innovation systems are strengthened by the inclusion of other local partners, e.g. public research institutes and private firms, in the clusters of excellence. *Sixth*, even at universities which did not succeed in receiving funding, the Excellence Initiative initiated a process of differentiation which might strengthen these universities in the long-run. Some federal states have provided additional funding for those concepts that were not successful in the Excellence Initiative, but still very promising. Therefore, it is most likely that the introduction of competition-based elements in the German university system will have a positive effect in the long run.

However, the Excellence Initiative was also criticised¹. Frequently mentioned arguments were related to the limited period of funding and the problems connected with sustaining the programmes by the universities themselves later on, negative effects of large collaborative projects on niches and, in particular, social sciences and humanities, and the negligence of teaching.

Conclusion

The public research system in Germany consists of full universities, universities of applied sciences and public research institutes which are separated from universities. All universities have the mission to carry out research and teaching. At full universities, research is as important as teaching. At universities of applied sciences, the focus is on teaching and to a lesser degree on applied research. In comparison to public research institutes, research at universities was negatively affected by chronic underfunding and relies mainly on external research grant, e.g. from the DFG. While public research Institutes benefitted from increased funding from the federal government, universities suffered from stagnant funding from the federal states.

While all of the approx. 100 full universities formally have the same status, their spectrum, intensity, and quality of research differs strongly. In the past, the university system lacked differentiation and competition. However, in recent years, new competitive elements were introduced by the

Excellence Initiative. This resulted in a stronger and more visible differentiation of research at public universities. University management also needs reform and the first steps have been taken recently. In the past, the system was characterised by a lack of performance-based incentives and professional management. Research funding based on competition has been an efficient tool to induce reform. However, there is still a need to increase the funding available for the university system as a whole in order to ensure a sufficiently high quality of research at German universities.

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¹ Schiller, D. (2011), pp. 109-121.