

Summary

Science is usually described as a social subsystem, whose development and **quality control primarily takes place via internal actors** and intradiegetic self-monitoring. The control mechanisms and instruments – such as peer reviews, evaluations of research institutions or the informative value of achieving third-party funding – have long been subject of research and critical debate. Yet, one instrument that is intended to serve both scientific self-monitoring and quality development has not received widespread attention: **scientific advisory boards (SABs) within the scientific community**.

We understand SABs as collegial bodies that provide consultation services for scientific institutions or individuals, are composed of a majority of scientists, whereby scientist in this context means that the person currently – in addition to being a member of the SAB – holds a position in the scientific community or has done so until retirement.

Thus, in the context of SABs scientists receive scientific advice on scientific issues by other scientists: The scientific system advises itself. SABs generally are seen in a positive light but are often protected from outsiders' observations. As a result, **there is no systematic knowledge or empirical data on whether SABs fulfill expectations** or have other productive effects. The service of consultancy by science for science so far only became visible in studies of scientific institutions if these institutions maintain SABs. SABs were, so to say, bycatch and often treated accordingly – meaning with only secondary interest.

Yet, SABs supposedly generate considerable **costs at the level of the organizations and the individuals involved**. These include costs which are necessary for maintaining the logistics of the advisory board, time spent by SAB members not spend on other (scientific) activities, and costs that are incurred for maintaining the (transfer) relationship between advisors and those being advised. The first one is a direct cost, the latter two indirect or **opportunity costs**: the time resources consumed by SAB activities cannot be used for other tasks, i.e., ideally for work in research or teaching. Since SABs are a very common feature of the science system, it must be assumed that a significant amount of resources is being bound by them on a systemic level. In summary, SAB incur so far unexplained costs, while their benefits have not yet been clarified. From this discrepancy, misallocations of resources may result.

Against this backdrop, an exploratory study was undertaken, analysing the **prevalence and distribution of SABs in the German science system**. The empirical survey shows that the distribution of SABs varies greatly: in some sectors they are non-existent, in others they are mandatory. An estimate for the entire German science system shows the following results:

- 1.184 SABs are active for journals,
- 463 SABs for research projects, based on a survey of the Deutsche Forschungsgemeinschaft (DFG) excluding individual grants, on federally funded projects, on research-funding foundations like the Volkswagen Foundation, and on long-term projects of the Union of Academies of Sciences,
- 292 SABs at extra-mural research institutions, including Fraunhofer-, Helmholtz-, Leibniz-, Max Planck-associations and societies, research institutes at the *Länder*-level as well as research museums, collections and libraries
- 163 SABs at university-based institutes and centers,
- 141 SABs as juries for scientific awards,
- 139 SABs for study programs,
- 112 SABs at professional societies and
- 13 SABs in federal- or state-funded research programs.

Tentatively, we estimate that there are **approximately 2.500 SABs in the German science system**. Yet, distribution is uneven: There are areas that commonly involve SABs, while others do so to a lesser extent or not at all.

- The first group includes professional societies (23 % of which have SABs), professional journals with 46 percent SABs, and extramural research institutions, which feature SABs with values between 40 and 100 percent, with the exception of the Fraunhofer-institutes. Long-term research projects of the Union of German Academies of Sciences as well as scientific prizes are also always supported by SABs. In total, this group has an average of 50 percent SABs.
- In comparison, SABs exist only in marginal numbers in degree programs and federally funded research projects (1 % each), in research projects funded by donor foundations, university

institutes, Fraunhofer-institutes, federal and state funded programs (each between 3-6 % SABs), and in DFG-funded research groups and centers, where SABs stand at ten percent. On average, this group features two percent SABs.

Two conclusions can be drawn from that. Both degree programs and university institutes are more tightly associated with academic teaching and learning than research, and both are among the units that have the lowest SAB prevalence. In contrast, it is primarily institutions associated with research that have a high prevalence of SABs. We thus conclude that **SABs are more widespread in research than in teaching.**

At the same time, however, advisory boards are also rather rare in research projects, with the exception of the long-term projects of the Union of German Academies of Sciences. The temporal limitations of research projects could play a role here. This is supported by the fact that another temporary unit, namely federal- or state-funded research programs also have a low density of SABs. The special case of Fraunhofer institutes – both permanent and research-oriented but with almost no SABs – can be explained by the fact that, due to their orientation towards knowledge transfer, they feature boards staffed mainly with practitioners and other stakeholders. In short, **the closer to research and the more permanent a scientific unit is, the more likely it is to count with a SAB.**

Membership characteristics show some overarching commonalities: The **typical advisory board member** is a professor, male, older than 40 years, but has not yet reached retirement age. Male professors (in Germany that means having published a second book called *Habilitation*) dominate the advisory boards, yet, with proportions between 58 and 68 percent less than the overall proportion among the *Habilitierte* in Germany. An analysis of the age structure reveals that the vast majority of SAB members are not yet retired: In all surveys, the majority of members are between 40 and 70 years old (quoting always higher than 60 percent). The proportion of people over the age of seventy (and thus definitively retired if not holding a rare senior professorship) oscillates between three and five percent.

Internationality varies depending on the function of the SAB. On average, **61 percent of all SABs have international members**, but there are differences. Journals, most of which operate internationally and whose SAB often met online even before the corona pandemic (if they do meet at all), recruit their members predominantly internationally, with the result that 98 percent of their SABs have at least one international member. Institutions such as university institutes, where SAB members have to offer not

only scientific expertise but also knowledge on local or national conditions of the science system, and whose advisory board meetings are (also) held physically, recruit more from the German science system. **64 percent of all advisory board members are scientists associated with a non-German institution.** Excluding journals' SABs, the figure is 27 percent.

The number of members that form a SAB also varies. Three groups can be distinguished: For almost all SABs, **the average number of members is five to ten**, while for federal- or state-funded programs and professional societies it is ten to twenty members, and for SABs at journals 25.

On this basis, it is possible to estimate how many scientists are active as advisory board members in the German science system. Based on our extrapolated 2.500 SABs, the total number is estimated to hover **around 40.500 advisory board members.**

If foreign members are excluded (since costs associated with them are not incurred in the German science system) and if it is assumed for the sake of simplicity that each professor only belongs to one SAB, we can conclude that 40 percent of the 25.643 university professors working in Germany are actively involved in SABs (21 percent without journal advisory boards), meaning as well: 60 percent are not (79% without journal advisory boards).

The costs of the advisory board system are offset by their benefits. For the advised, **the benefit of having 'critical friends'** is probably dominant. This means that advice is given by peers, who have the necessary distance to the day-to-day business of the advised institution to be able to formulate strategically and/or conceptually innovative suggestions for quality development, to point towards trends in a certain field or discipline, etc. In some contexts, SABs are also active in an **evaluative capacity**, i.e., they serve as steering instruments and support the indirect governance of superordinate structures.

For advisory board members, the benefits vary depending on the type of SAB. They include **benefits of networking** that result from peer consulting and evaluative activities. Ideas can be developed on the basis of the suggestions received through work at SABs. Experiences, e.g., about successful application strategies or currently emerging research topics, can be exchanged. All this in turn is **useful for one's own research.**

Moreover, **professional ethos** arguably plays a heavy role in the decision to be (and stay) active in SABs. This ethos may partially suspend considerations about cost-benefit calculations as peer review and consultation form integrals part of the role of being a scientist.