TECHNOLOGY TRANSFER IN GERMANY

Germany is the biggest economy in the European Union and competes with Japan about place three in the ranking of the largest industries worldwide. Germany's success is built on Science and Technology.

The first German university was founded 1386 in Heidelberg and started the long tradition of scientific curiosity. In 1825 the first Technical University was founded in Karlsruhe, now KIT Karlsruhe Institute of Technology, starting to emphasize applied technology research. In the 20th century, non-university research institutes were established.

R&D - Differences between Germany and Japan

Germany spends more than 3% of GDP on R&D, but less than Japan.

In Japan, almost 80% of R&D is done in industrial laboratories versus 60-70% in Germany. The reason is, that on the one hand Japan is characterized by big industrial groups, the Keiretsu, that do considerable own research. Hitachi for example, started its Central Research Lab CRL already in the year 1943.

Germany however does not have comparably large industrial groups. It has a strong Small and Medium Sized Enterprises (SME) sector with many unique companies, that produce their own products in a niche market and sell them worldwide. They often cannot afford own research laboratories and therefore depend on strong external research capabilities that exist in Germany.

Here, the Technology Transfer (TT) from science to industry becomes crucial and Germany therefore has an elaborated TT landscape. Especially the 70 Fraunhofer Institutes are dedicated to providing competence up to product or production level. Many universities are doing R&D and have technology transfer offices. Germany has a larger public R&D sector than Japan with around 1.000 public research institutes.

In Japan however, due to the industrial structure of big groups, transfer from public R&D in universities and public labs to the industry was less needed for a long time. The big industrial groups were capable of doing their research by themselves and only complemented this research by external sources, also from foreign countries. Likewise, public research in Japan did not have incentives to transfer their knowledge. This is now gradually changing.

Research at Universities

Germany has around 400 Universities that are building on a long tradition. They are influenced by the ideas of Wilhelm von Humboldt (1767–1835), the founder of the Berlin University, to have a unity of learning, teaching, and research. This implies that a professor not only teaches, but also does research and the students not only learn, but also participate in research as part of their education. This laid the foundation for research being conducted in all universities and constitutes the long tradition of scientific curiosity.

Today there are 110 Universities, including 20 Technical Universities. They can award degrees up to the doctorate (PhD). Some university labs also conduct research for industry and have big laboratories.

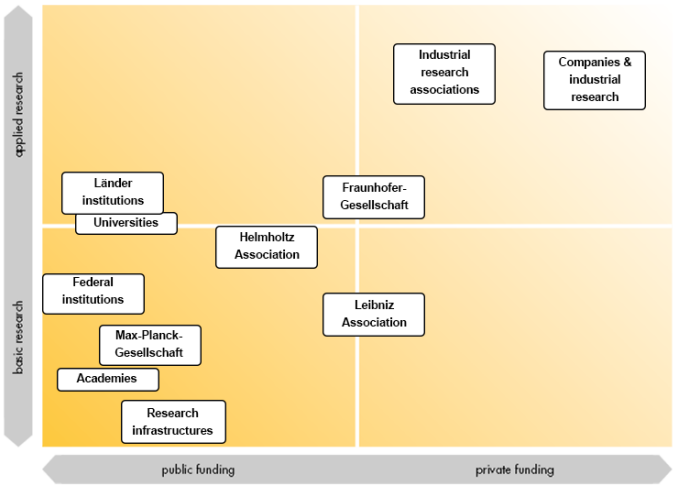
The second category are 210 Universities of Applied Science, including 40 Technical Universities of Applied Science. The Universities of Applied Sciences usually only award degrees up to a Master's degree, though some can award doctorate (PhD) degrees as well.

The third category are 50 Art and Music Colleges and 30 Universities of Applied Administrative Science in Germany.

The higher education intuitions spend around 20 billion Euro per year for research, almost half of that (9 billion Euro) is through third party funding. A big part of that comes from German funding agencies like DFG and the selection process is competitive. Third party funding also includes funding directly from industry for very applied research for industrial applications.
→ Universities in Germany

Research Institutes

Germany also has around 1.000 public research institutes. They can be distinguished by their focus from basic research to applied research and their funding from public funding to private funding. There are for example the Max-Planck Institutes for basic research producing Nobel Prize Winners and on the other side of the spectrum the Fraunhofer Institutes offering applied research of help for industry. In between are more organizations as shown below.



Souce: https://www.research-in-germany.org/en/research-landscape/research-institutions.html

→ Research Institutions in Germany

There are the following groups of research institutions:

1. Fraunhofer Gesellschaft
   76 institutes and 30.000 staff, focus on applied research for industry, 20% basic funding, 80% contract research from industry and public projects.
2. Max-Planck Gesellschaft
   86 institutes and 24.000 staff, focus is basic research, 88% basic funding from government, 12% third party funding, 31 Nobel Prize Winners.
3. Helmholtz Association
   18 centers and 44.000 staff, focus on future applications like space, health, energy, environment, 70% basic funding, 30% third party funding

4. Leibniz Association
   97 institutes, 21.000 staff, covers on all academic areas, 62% basic funding, 28% third party funding, 10% others
5. Academies of Science and Humanities
   Leopoldina: 1652 founded, 1.600 staff from 30 countries. Independent science based advise for politics, 90% basic funding
   acatech – National Academy for Science and Engineering: founded 2002, 600 staff, focus is forward-looking recommendations and knowledge transfer between science and industry, 95% basic funding
   Federal Institutes
   44 institutes belonging to the federal government and reporting to ministries, 20.000 staff, focus is supporting ministeries, 95% basic funding
6. Federal State Research Institutes
   143 belonging to the federal states, 6.000 staff, 92% basic funding

Private Research Institutes

German Industry is also conducting research with Volkswagen leading the spending. There are however also special institutes serving well the SMEs. The Federation of Industrial Research Institutes (AIF) is a network of 84 Industrial Research Associations that each run partly several laboratories with very specialized topics, like brewery, leather, iron, etc. and they serve approximately 130.000 SMEs.

Further Information:

Overview of Keyplayers of the German-Japanese Technology Transfer Landscape:
https://www.dwih-tokyo.org/transfer/

Information on the Japanese Research Landscape and Cooperation with Japan:
https://www.dwih-tokyo.org/en/the-japanese-research-landscape/