



# VALUABLE COLLABORATION

**ON THE VALUE OF RESEARCH COLLABORATION BETWEEN FIRMS AND UNIVERSITIES**

By:

Jeppe Wohler, Program Manager

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The Think Tank DEA  
Fiolstræde 44  
1171 Copenhagen K  
[www.dea.nu](http://www.dea.nu)

# Executive Summary

The political interest in strengthening and especially accelerating the contribution of research to innovation in industry and solutions to society's challenges has influenced Danish innovation policy since the beginning of this millennium.

With the establishment of the Ministry of Science, Technology and Innovation in 2001, research policy was officially linked to innovation and technology policy, and it marked a breakdown with earlier assumptions that research of high scientific quality in itself would prove valuable to society. Over time, different government strategies reflect rising political expectations that research is delivering value to firms and society at an ever-increasing rate. Those expectations are more concretely pursued in the creation of stand-alone political instruments with an increasingly comprehensive aim. In 2003, the VK-government supported research collaboration between firms and universities with a time frame of four to ten years and innovation partnerships of one to four years. In 2012, the SRSF-government launched a new political instrument, *Societal innovation partnerships*, which could potentially accommodate activities across the value chain from educational activities, through research and development to innovation activities such as scaling up of promising solutions, adapting regulatory issues as well as search for public demand - all within a time frame of three to five years. In 2020, the S-government extended the focus from the entire value chain to include the diffusion of new research-based solutions in society. The new instrument, *Green research and innovation partnerships*, must, within a two to five-year period, support research and development activities, address challenges in terms of regulation and demand, scale and make promising solutions and technologies sufficiently cost-effective to a degree where they can be diffused on market terms and lead to significant greenhouse gas reductions, which must contribute to the fulfillment of the Danish Climate Act's target of a 70 percent reduction of greenhouse gas emissions on Danish soil before 2030.

But to what extent are the political expectations consistent with the value, which firms and their collaborators at universities experience as a result of the research collaboration? What factors typically influence whether firms reap the benefits of collaboration with universities? And when do firms expect to benefit from valuable collaboration with university researchers? Those questions are the subject of DEA's interview study, which focuses on firms' perceived value after successfully completed research collaboration with universities. The interview study focuses on the large, research-intensive Danish firms, which account for almost three quarters of investments in research and development in the Danish industry.

The study is based on interviews with management representatives responsible for research and development in Danish research-intensive firms with more than 250 employees as well as interviews with some of their university partners. Two rounds of interviews were conducted in order to study the development in the relations between the firms and their university partners. A total of 25 semi-structured interviews were conducted with 16 interviewees from November 2017 until March 2018 and from March until April 2021.

## Conclusions

The large, research-intensive firms in DEA's interview study engage in a number of different forms of collaboration with university researchers, each of which forms the basis for the firms' expectations of the valuable collaboration with research institutions. Overall, the collaboration covers a wide range of multi-year research projects, Industrial PhDs and Postdocs, commissioned research, development of research infrastructure, co-financed professorships, part-time positions and exchange of staff and a number of forms of collaboration with universities on the education of new graduates, which are not the focus of this analysis but, nevertheless, often associated with the firms' research collaboration with university researchers and environments.

Not all types of research collaboration can be co-funded by public foundations. Even where public funding is available, firms sometimes choose to finance research collaboration themselves. At the same time, the firms' collaboration with universities extends far beyond the Danish borders and thus involves universities on several continents. But the value which firms in the interviews experience from successful collaboration with researchers is not contingent upon where in the world the universities are located - except in relation to educational collaboration, where the aim is often to recruit locally.

Overall, the interviewees of the analysis experience that successful collaboration with university researchers provides firms with access to analytical techniques and test facilities, technologies, branding, networks, and capacity building in the form of new knowledge, competencies and employees. Across the study's two rounds of interviews with firm participants and their university partners in the winter of 2017-2018 and the spring of 2021, the firms' experience of value from research collaboration with universities is consistent.

### **No expectation of new products in the short term**

Several interviewees from firms in the food industry, life science, the manufacturing industry, and the energy industry dismiss the idea that collaborating with university researchers creates new products in the short term. On the other hand, the large firms experience that their collaboration with universities contributes a number of smaller, albeit significant, benefits within a few years. The collaboration contributes to strengthening the firm's international knowledge network and the firm's branding as an attractive, knowledge-intensive partner and/or supplier to other firms. The collaboration helps to retain those of the firm's employees who have an interest in nurturing relationships with research environments. At the same time, new knowledge generated by the collaboration has proven to equip one of the firms in the study for a more qualified dialogue with its subcontractors, which has resulted in the subcontractor delivering services of both higher quality and at a lower price. The collaboration can also provide firms with access to new tools, methods and test facilities that can further strengthen the development of the firm's existing product portfolio. The continued development of existing products and solutions is a crucial precondition for the firms' competitiveness and continued survival, although this value is easily overlooked due to the Danish research and innovation policy's penchant for supporting the development of new products.

### **Capacity building a prerequisite for the development of new products in the long run**

In the long run, the value of the research collaboration is more related to the firms' development of new products and services. This is mainly achieved through capacity building in the form of new knowledge,

new competencies, and new employees as well as access to test facilities and technologies and networks. It is mainly in the long run that firms realize the benefits of the seeds they planted in previously completed collaborations with universities.

#### *Common with 10-20 years of development - after a successful research collaboration*

A firms' interest in research collaboration is often linked to a desire to strengthen the basic understanding of issues that may be crucial for the development of new and the adaptation of existing products in the long run. It is not uncommon for 10-20 years of development – after the firm has identified a promising idea from the collaboration with researchers – before the promising idea is translated into a market-ready product or a market-ready service. This is often an iterative process, which requires further collaboration with universities and suppliers with a focus on, for example: searching for the availability of raw materials in large quantities to scale up production; compliance with legal documentation requirements – this includes clinical trials; testing the safety, reliability and robustness of new solutions in large-scale production; material development, design solutions, packaging solutions, marketing, etc. According to the interviewees, the exception is the ICT and electronics industry, as an example of an industry with significantly faster development processes than the food industry, life science, the manufacturing industry and the energy industry, which the present study covers.

#### *Acquisition of intellectual property rights is important, but not an end in itself*

The opportunity to acquire the intellectual property rights, which collaboration with university researchers can generate, is often crucial to a firm's interest in collaborating with the researchers. However, this is not an end in itself, and the value from collaborating with university researchers can also involve gaining knowledge of a more pre-competitive nature, which in some cases can be even more valuable to the firm if such knowledge is diffused to more actors in the sector rather than just the firm. This applies, for example, to the development of new pharmaceutical drugs, which are often the result of collaboration between different firms and research environments, or in cases where there is not yet a market for the firm's product, in which case the firm has an interest in encouraging other private and public stakeholders to develop knowledge of and demand for new technologies and solutions.

#### *Cross-fertilization of knowledge in firms and universities*

Several interviewees from firms emphasize that they actively contribute to developing new knowledge in research projects co-funded by public foundations. Thus, knowledge is not just transferred from universities to firms, although the former often – but not always – work with a longer time frame to engage in the understanding of more fundamental issues than firms do.

#### *Skills upgrading and recruitment in a continuum of collaboration*

In addition to the acquisition of new knowledge, the collaboration with university researchers is also important for the firms' ability to upgrade existing employees' skills and recruit new ones. It provides firms with internal competencies, which can be difficult to buy from consultants and through commissioned research. The long-term value of skill upgrading and recruitment is significant to the firms in the study and generally equal to or sometimes even greater than the value gained from acquisition of the new knowledge provided by the research project. At the same time, the collaboration with the universities contributes to creating and maintaining relationships with leading research environments and specific researchers who are interested in and understand what business collaboration requires.

It often takes time to build such trusting relationships, which is why firms often have an interest in continuing the collaboration in so far as it supports the firm's long-term strategy. Several of the firms in the analysis are thus in a continuum of research collaboration - with the same and/or with thematically supplementary partners.

Finally, the large firms in DEA's study are engaged in various forms of educational collaboration with the universities in order to strengthen the firms' opportunities for recruiting the best candidates.

### **Several factors affect firms' ability to create value**

The chances for a firm to reap the value of collaborating with researchers are greater when the collaboration is about questions close to the firm's long-term core interests, when the firm gains broad and deep knowledge of problems or issues related to its potential product development, and when the firm has the opportunity to maintain crucial relations with the research communities. Negotiations on the intellectual property rights associated with the collaboration can be decisive in terms of which research institutions a firm is initially interested in collaborating with. In relation to realizing the value of market-oriented products, which stem from the collaboration with university researchers, it requires significant amounts of time and financial resources to make large-scale tests and demonstration experiments in order to increase the security of, meet the documentation requirements, and reduce the cost of new products and services. In addition, the firm may be dependent on the general maturation of the market and its ability to absorb new products, which is why firms sometimes have to wait for the development of the market and other partners before the launch of a new product.

### *Public co-financing essential for firms' long-term research collaboration*

The financial situation of a firm can be decisive in whether or not it engages in long-term collaboration with university researchers. Here, several interviewees point out that public co-funding of the collaboration with universities can contribute to the firm's research department being able to shield its research projects and more long-term capacity building from strategic re-prioritization and internal cost cuts in the organization. This is due to the fact that a firm, by receiving public co-funding, commits itself through contracts to the collaboration with public investors as well as partners. In addition, several of the firms in the study work with a relatively broad portfolio of research collaborations in the recognition that not all collaborations bear fruit and that the firm or management can change strategic direction, which can end otherwise promising collaborative relationships.

### **What are the main take-aways for foundations and politicians?**

DEA's study points to the need for the development of new research and innovation policy instruments to take into account that it often takes decades for large firms to create new products and services on the basis of collaboration with research environments. Too narrow and too short-term a product focus in the implementation of public funds to support the collaboration between firms and researchers risks counteracting the real value of the collaboration in the form of more long-term capacity building.

At the same time, it is worthwhile for politicians, government officials, and public foundations to keep in mind that precisely public funding for collaboration between universities and firms helps financing and maintaining firms' long-term focus on developing new as well as adapting existing products. Both are crucial for firms to sustain their competitiveness and maintain jobs but can nevertheless be challenged by firms' financial or strategic re-prioritization.

  
**DEA**

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