R&D collaboration of universities and PRIs with firms

Through R&D collaboration with firms, universities and public research institutes share important innovation skills with industry that would otherwise be underutilized or streamed into delivering other tasks. Universities and PRIs may also provide access to developed R&D infrastructures needed for the design and testing of innovation products and processes. In addition, scientists and engineers can provide advice, consultancy and extension services to innovative businesses. R&D collaborations of universities and PRIs with firms may take a wide variety of forms (e.g. joint labs, industry-sponsored departments, long-term contracts, informal arrangements).

What is R&D collaboration of universities and PRIs with firms?

From the systems perspective, firms are at the core of innovation systems since they are the only actors capable of delivering innovative products, processes and services to the market. In this context, universities and public research institutes serve as important facilitators and promoters of the overall innovation process by sharing knowledge, expertise, innovation skills and technological applications. One of the major objectives of R&D collaboration between universities and industry is to ensure a smooth transfer of knowledge and technologies from scientists and engineers to entrepreneurs – an exchange process where a wide range of innovation skills and communication channels is involved.

In general terms, R&D collaboration presumes a stable link between universities and PRIs on the one hand, and private firms on the other, with the objective of developing a specific innovative product, process or service, or a range of such products and services. Larger-scale partnerships may also involve an education and training component, where knowledge transfer occurs between university/PRI researchers and firm employees through a variety of special programmes and training mechanisms.

Collaborative schemes may take the form of cooperation agreements, joint labs, industry-sponsored departments and research centers, long-term contracts, informal arrangements, industrial placements, and scholarships.

How does R&D collaboration of universities and PRIs with firms contribute to innovation performance?

- Through R&D collaboration with firms, universities and public research institutes share important innovation skills with industry that would otherwise be underutilized or streamed into delivering other tasks.
- The collaboration activity also presumes a certain amount of training and knowledge exchange that firms may get through partnership arrangements with universities and PRIs.
- Resources are directed into particular innovation-related tasks, allowing for better concentration and organization of available financial resources and social capabilities.
- Universities and PRIs may provide access to developed R&D infrastructures needed for the design and testing of innovation products and processes. In addition, firms may use these infrastructures to solve their problems but also have an opportunity to learn from scientists and engineers sharing these facilities with their employees.
- In some cases, scientists and engineers provide advice, consultancy and extension services that are considered soft skills and knowledge needed for the management of innovative projects and improvement of innovation performance in particular tasks.

Conditions ensuring the contribution of R&D collaboration with firms to innovation performance

- Good science-industry links are imperative for effective R&D collaboration between firms and publicly funded research organizations.
- Technology platforms and technology transfer offices provide important grounds for effective R&D collaboration, and also serve as mediators and facilitators in organizing and sustaining new partnerships.
- Effective collaboration largely depends on a good match between the partnership members. [illegible] participants are critical success factors in R&D collaboration. Geographical proximity has also been found to have a significant influence on the positive outcomes of R&D partnerships.
- Proper IPR regimes are essential vehicles for balancing the different interests pursued by [illegible] should be sure that their knowledge is well protected so that they are not afraid of disclosing their ideas to the public and facing fierce competition from rivals.
- Much depends on scientific community norms, since they have significant impact on how [illegible] importance of research career incentives that may encourage or prevent scientific collaboration with industry.
- Mutual trust is a vital component of science-industry partnerships: workloads and benefits must be fairly distributed and shared. Information should stay within the confines of the partnership. Clarity of intellectual property ownership is also very important.
- Some research has shown that personnel stability in joint projects is crucial for the success of R&D collaboration.

Measurement

It is difficult to evaluate collaborative schemes between firms and universities/PRIs. Cunningham and Gok (2012) point at four particular challenges:

- Timing and periodicity of R&D collaboration between firms and publicly funded research [illegible] organized informally. Moreover, anticipated outcomes and impacts are not likely to manifest until after some time into, and even after the completion, of collaborative projects.
- The scope of impact may be challenging to define. Although certain statistics may reflect the overall outcomes of a programme, tacit achievements, outputs and experiences of individual projects and teams are almost impossible to discern.
- A reference point prior to the time when collaboration actually started is needed to identify the effects and outputs of the programmes, and benchmark them with what would have happened otherwise.
- Informal collaborative links and relationships are difficult to quantify but often play critical role in continuous innovation inputs and firm growth.

What policies relate to R&D collaboration of universities and PRIs with firms?

Policy rationales

Much policy research about R&D collaboration between firms and publicly funded research organizations proceeds from market failure logic:

- Partnerships help resolve information asymmetries between firms, since universities and PRIs work in the public domain and are likely to share their achievements with the wider society and also help their partners to reach the knowledge frontier. Governments may also satisfy the need to internalize informational spillovers.
- Collaborating firms are more exposed to deeper knowledge and are more likely to think strategically, sometimes sacrificing their immediate needs and the rational motivation to maximize short-term profit.
- R&D collaborations create economies of scope and scale by concentrating resources in important technological areas.

- Partners share risk in high-risk projects by reducing uncertainty and preventing risk aversion.

A system failure approach also provides several rationales to justify the need to support science-industry collaborations:

- Partnerships help resolve network failures by improving knowledge flows, creating new and developing existing innovation networks, and by serving as a medium for knowledge transfer.
- From the perspective of coordination failures, it is often difficult to transfer knowledge created in universities and distribute it among firms and other organizations that can make practical use of it.
- R&D collaboration is beneficial from the point of view of capabilities and resource failures: [illegible] Sometimes innovation projects may be too complex for single actors to fulfil and joint effort may bring better results.
- Publicly funded research organizations often provide R&D infrastructure to firms, thus resolving infrastructural failures. Scientists and employees of firms may collaborate in shared facilities and learn from each other.
- R&D collaboration can also contribute to guiding transformative change in innovation [illegible] activities never develop in isolation, and it is important to align them to overall system processes and include them in strategic visions.

Policy objectives

Policy objectives regarding R&D collaboration of universities and PRIs with firms include:

- improving collaboration mechanisms between science and industry, and transferring knowledge from academia to business and vice versa
- providing financial support for new science-industry alliances and partnerships
- allowing for more strategic development of knowledge-intensive businesses through better exposure to university research
- establishing stable knowledge transfer mechanisms, and transforming firms' capabilities to adapt and commercialize scientific discoveries and university research
- mediating science-industry relations to ensure effective knowledge transfer and collaboration
- addressing the needs of all participating bodies and persons
- providing a supporting infrastructure for R&D collaborations between firms and publicly funded research organizations.

Policy instruments

Policy instruments in support of R&D collaboration of universities and PRIs with firms include:

- Providing stable long-term support for particular R&D collaborations. Empirical evidence [illegible] the programme must be clearly formulated from the very beginning, and its implementation must be consistent (cf. OECD, 2004).
- Including educational components in programmes supporting R&D collaboration. Program impacts are enhanced when educational components are included.

- Supporting innovation networks and clusters. Policies aimed at supporting innovation collaborations tend to be more successful when partners are located in geographical proximity and can sustain everyday collaborations.
- Creating incentives for researchers to collaborate with private firms. These can include both for work on knowledge transfer tasks (although a proper balance must be sustained between basic science and applied research).
- Establishing legal and regulatory frameworks that allow scientists to collaborate with industry and to transfer knowledge gained in publicly funded projects.
- Creating collaborative research centers. Collaborative research centers have been named as organizations and private firms, where they can work together and gain critical learning experience.
- Encouraging collaborative and knowledge exchange projects. Collaborative and knowledge exchange projects (e.g. UK Knowledge Transfer Partnerships) have similar objectives to collaborative research centers but with looser structure and coordination mechanisms.

References

- Cunningham, P. and Gok, A. (2012), “The impact and effectiveness of policies to support collaboration for R&D and innovation”, Compendium of Evidence on the Effectiveness of Innovation Policy Intervention, NESTA, London.
- Dyer, J.H. and Powell, B.C. (2001), “Determinants of success in ATP-funded R&D joint ventures: A preliminary analysis based on 18 automobile manufacturing projects”,
- OECD (2004), “Public-private partnership for research and innovation: An evaluation of the Australian experience”, OECD, Paris.
- PACEC (2011), “Evaluation of the collaborative research and development programmes: final report”,
- Regeneris Consulting Ltd. (2010), Knowledge Transfer Partnerships Strategic Review, Technology Strategy Board.
- Wilson, T. (2012), “A review of business-university collaboration”, BIS, London.

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