Fraunhofer ISI

FRAUNHOFER INSTITUTE FOR SYSTEMS AND INNOVATION RESEARCH ISI

CONTRIBUTION TO THE GERMAN INNOVATION SYSTEM – FRAUNHOFER-GESELLSCHAFT

Summary

The objective of this study is to address Fraunhofer's contributions to Germany's success as a location for business and innovation and to demonstrate and measure the contributions.Taking into account the multifaceted nature of Fraunhofer's contributions, which are mostly only indirectly quantifiable, the study uses a systemic perspective that combines approaches based on innovation economics, micro- and macroeconomics.

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The innovation economics perspective

The innovation economics approach illustrates Fraunhofer's role in the development of technologies and technological lines, with findings being deduced empirically from qualitative interviews with technology experts.

Technologies to which Fraunhofer has made a significant contribution to the strong position and international competitiveness of the German industry as well as Germany's reputation as a place for innovative businesses have been identified, for example in the fields of renewable energy, laser technology in production processes, and material sciences.

In the case of technologies that are still at the early development stage but might become especially relevant in the medium- and short-term, Fraunhofer has already made significant and demonstrable contributions especially in nano-electronics, navigation technology, and the next generation of battery technologies, for example.

The microeconomics perspective

The microeconomics approach focuses on the structures and effects of cooperation between companies and Fraunhofer.
The results showed that cooperation with Fraunhofer is of particular significance for innovative companies, for companies with a complex product portfolio, and especially for small and medium-sized enterprises (SMEs).

While no direct effect from cooperation with Fraunhofer was seen for large companies, there was a significantly positive effect on operating income and EBIT (earnings before interest and taxes) for small and medium-sized companies.

In addition, the results indicated that partners in consortium projects generally award Fraunhofer a direct research contract within the first three years after project completion. Fraunhofer institutes also have measurable economic impact on the respective metropolitan areas where they are located. These effects are particularly large when there is a high business revenue ratio.

The macroeconomics perspective

The macroeconomics approach looks at the economic contribution Fraunhofer has made towards Germany's regional economy. The results were used as the basis for estimating the economic, fiscal, and employment effects that can be attributed to Fraunhofer.

In 2014, Fraunhofer contributed (based on around € 1.1 billion in national project earnings) around € 20.1 billion to Germany's GDP (a ratio of approximately 1:18.3). This generated estimated tax revenue of approximately € 4.1 billion on the national, state and municipal level, compared with around € 1.1 billion in public financing.

This means that for every euro of public funding spent on the Fraunhofer-Gesellschaft, three to four euros were received back on the national, state, and municipal level. The monetary effects for the overall economy exceed Fraunhofer's project earnings more than 18-fold.

Conclusions

Fraunhofer's contribution is significantly more than just its core activities of application-oriented research and technology transfer. Additional Fraunhofer activities within the German scientific and innovation system consist of SME support, training and teaching, the application of international knowledge, and helping German industry to tap into international markets.

Right from the early stages of a technology's development, Fraunhofer builds up expertise and resources in order to implement mature technologies at the right time in conjunction with industry. This requires, even in difficult times, farsightedness in terms of research topics and their continuity.

In light of the role Fraunhofer plays in collaboration with SMEs together with the political objective of a stronger orientation towards innovation - slightly more than 3% of GDP is to go toward R&D - Fraunhofer's significance for the German scientific and innovation system will further increase.

The Fraunhofer funding model - with one-third coming from institutional funding, industrial earnings, and public contracts, respectively - has also proved to be ideal for pre-competitive research. The decreasing shares of institutional base funding from the federal and state governments for most Fraunhofer institutes in the years 2006 to 2015 made it increasingly difficult to provide application-relevant knowledge in a future-oriented and continuous manner. Under these constraints, it became significantly harder to maintain factors for success, specifically pre-competitive research, a forward-looking approach, and continuity in research subjects.

Yet findings show that both institutional funding and the funding of individual projects at Fraunhofer are good investments with a 3-fold return for the public purse and an 18-fold return for industry.