



## Projektbericht

Rheinisch-Westfälisches Institut für Wirtschaftsforschung  
WSF Wirtschafts- und Sozialforschung Kerpen

### **On-going Evaluation of the Industrial Collective Research Program in the Period from 2005 to 2009**

Final Report: Summary of Findings

Research Project Commissioned by the  
Federal Ministry of Economics and Technology (BMWi)

# Imprint

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# Project Report

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## **On-going Evaluation of the Industrial Collective Research Program in the Period from 2005 to 2009**

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## Summary of Findings

Since 1954, the program of the Federal Ministry of Economics and Technology (BMWi) for funding industrial collective research (IGF) has supported application-oriented pre-competitive research. This program supports the establishment of long-term research networks that pick up industry-related research topics. IGF is unique throughout the world and represents, without a doubt, an important advantage for small and medium-sized enterprises (SMEs) in Germany. The background for the establishment of IGF is that financing of application-oriented basic research through internal financial resources of SMEs is subject to very tight limits. At the same time, exactly this kind of research is important for the mid- and long-term competitiveness of SMEs. Therefore, IGF takes a central position within the technology policy of the federal government.

The task of the on-going evaluation of IGF by the Rheinisch-Westfälische Institut für Wirtschaftsforschung (RWI) and Wirtschafts- und Sozialforschung (WSF) in the period 2005 to 2009 was to determine whether the targets of this program were achieved and to develop suggestions for the improvement of program structures and processes. As part of the evaluation assignment, extensive empirical investigations were carried out. Among others, four comprehensive business surveys, surveys of research centers (Forschungsstellen) and industrial research associations (Forschungsvereinigungen) as well as numerous expert interviews were conducted. This report presents the core findings of that evaluation.

The IGF differs from other federal government programs promoting new technologies with respect to its organizational structure: The German Federation of Industrial Research Associations (Arbeitsgemeinschaft industrieller Forschungsvereinigungen e.V. – AiF) is responsible for the administrative support. Currently, about 100 industrial research associations are organized under the umbrella of the AiF in which companies from individual branches or technology fields are affiliated for collective research projects. This organizational model, which is based on the principle of self-organization, has proved to be an advantage: In a practical-oriented process, it actually simplifies addressing pre-competitive technological research topics coming not only from different branches of the manufacturing industry, but also from the production-related service industry. Simultaneously, intersectoral research fields that are of interest to several industries are addressed in this context. During the decades of IGF's existence, the principle of self-organization has allowed the industrial research associations to adjust their scientific orientation to newly emerging economic- and scientific-related structures. Nevertheless, re-

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search associations, which are technically closely interconnected, could still intensify their co-operation activities more than they currently do.

An efficient organization of the program procedures is of critical importance for the success of this kind of funding. This aspect includes process steps from generating project ideas and preparation of project tenders to project monitoring which should be in line with the goals of the program. The IGF projects are carried out by different kinds of research facilities, i.e., university institutes and extra-university research institutions. Our investigations show that the participation of companies, SMEs in particular, plays an important role and is obviously very common. However, the potentials with respect to program procedures have not yet been fully tapped. The participation of companies, SMEs in particular, as well as of technical committees during the project-determination processes increases the probability that relevant research results are rapidly diffused in business practice later on. In our view, the establishment of project advisory boards (Projektbegleitende Ausschüsse), in which project progress is discussed with company representatives, has been positively related to the achievement of the program objectives.

A central task of the on-going evaluation was to draw conclusions on the economic benefits of the program. With regard to program effects, each evaluation is challenged by answering the counterfactual question: "What would have happened if there had been no program?" In the case of IGF, the peculiarities of pre-competitive research must be taken into consideration in the search for an adequate answer: IGF project results are freely available, and no enterprise is committed to give an account of the exploitation of such research outcomes. Furthermore, new technologies are the result of complex processes in which there are always numerous participants involved: IGF projects pick up the results of other research work and, in turn, lead to further projects, which may be financed by IGF, by another program, or by corporate funds.

To provide evidence of the economic benefits of IGF, two industry studies were carried out on the role of IGF in mechanical engineering and the textile industry in Germany. In addition, companies and research institutions in Germany were questioned about the use of the outcomes of IGF projects. Thereby, it became clear that the results of IGF projects were widely used by companies following the progress of the projects and by SMEs in particular. On average, the outcomes of IGF projects were used by 3.3 companies. If one takes into account that not all products have directly resulted in industry applications, then a number of 5.3 companies for which the use became known is generated. These data refer to the cases of use that are known to the research institutions responsible for carrying out the projects. Furthermore, it can be assumed that the total number of companies using the IGF

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outcomes is significantly higher because of the pre-competitive nature of the projects and the free availability of the project outcomes. This holds particularly for those projects that lead to the establishment of standards and rules being then relevant for all companies of a sector.

This finding of widespread use of IGF project results is confirmed by outcomes of surveys of companies that took part in IGF projects. Approximately three years after completion of the projects, 40% of the companies from all industries involved in these projects, particularly by attending meetings of the project advisory boards, developed the research results further and implemented them in their companies, while yet another 30% were planning to use the project outcomes later on. The group of companies using IGF results clearly exceeds the number of the members of project advisory boards. In the textile industry, for two companies which used the results of, and took part in IGF projects, there was another enterprise using the results without having participated in IGF projects.

We were able to identify several dimensions in which IGF had an effect on firm and sector performance. Besides exploitation of project results by companies after their further development to firm-internal applications, IGF projects also contributed to advances in knowledge in engineering sciences and, therefore, to the development of the technical knowledge stock. In so doing, the IGF projects spur further research work and provide companies with background information for solving practical problems. Furthermore, the contribution of IGF to the training of young scientists who are familiar with practical topics should not be underestimated.

Moreover, the IGF funding contributes to the establishment and long-term maintenance of innovation networks. Within the scope of these networks, companies can address technological questions arising from operational practice to research centers, which in turn have many years' experience in tackling such questions. Our investigations clearly show that precisely this long-term network character, which differentiates this program from the other funding measures of the BMWi, makes it a central and valuable element for the German funding scheme. For example, networks between companies and research institutions supported by the IGF have contributed to the fact that German textile industry is at the cutting edge within the EU with regard to textile-related patent activities as well as to the proportion of high-tech textiles. Additionally, the program had a strong impact on innovation activities in the mechanical engineering industry in which IGF projects, due to their pre-competitive character, often served as technological "core projects" that influenced leading trends in relevant technological fields. In addition, despite the relatively modest use of funds, IGF has succeeded in making a substantial contribution

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to innovation activities in the mechanical engineering industry by creating a sound network between companies and research facilities.

Solving the technological matters which are dealt with within the projects is not the only crucial factor for the success of the program. Also functioning transfer chains from pre-competitive via application-oriented research to product and process development is of critical importance. Successful technology transfer depends on intensive efforts of persons involved in industrial research associations and research centers. For successful technology transfer, it is important, on the one hand, to get companies involved in project processes already starting with the generation of project ideas and, on the other hand, to make the results of projects actively known to all potential users after completion of the project by using different transfer channels. Our investigations showed that, besides the group of companies already closely involved in ICR projects and/or using the results without any active involvement in projects, there is still a larger group of companies from innovative SMEs (*Mittelstand*) for which the results of IGF-financed projects are of potentially great interest. These companies have only partly been reached by this program, depending on the conditions prevailing in the individual industries and the structures and the quality of transfer activities of individual industrial research associations. In this regard, there is still a significant potential for improvement.

The program has taken account of changed underlying conditions for R&D, amongst other things establishing new funding modules. The funding module ZUTECH ("Future Technologies for SME") proved very successful. ZUTECH was able to close a gap in funding activities by addressing interdisciplinary, cross-industry co-operation. Both most recent funding modules CORNET (Collective Research NETworking) and CLUSTER were also included in the examination. While CORNET supports international projects of IGF, CLUSTER projects aim to bridge the transfer path from basic research to the application of research results in companies by means of the combination of *DFG* (Deutsche Forschungsgemeinschaft - German Research Foundation), IGF-, and company-financed projects. Both last-mentioned funding modules will be studied in greater depth in 2010 within the framework of a follow-up study.

When dealing with a complex program of technology funding like IGF, which has been in operation for more than five decades, new starting points for improvements will always arise due to changing economic structures and the development of the knowledge base of technology policy. As a part of our "Mid-Term Evaluation" (*Zwischenbilanz*) in 2007, we have already identified potential for improvements on the basis of findings that had been available at that time. We forwarded proposals that have already been partly implemented. Our final report at hand develops these

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proposals further into 35 individual recommendations by also taking entirely new aspects into account.

Selected recommendations comprehend the following aspects: Starting points for further improvement in the program structures result, amongst other things, from the closer co-operation between the different industrial research associations as well as from strengthening the central organizational unit of the AiF. Additionally, we recommend adjusting the program definition of SMEs to the current circumstances relating to R&D activities in SMEs (turnover of up to €200 million or up to 1,000 employees). Furthermore, the transfer of knowledge and research results to industry should be better documented, on the one hand. On the other hand, despite progress that has been made in recent times, we could also identify starting points for further improvement of transfer activities. Advisory activities should be intensified and more emphasis should be placed on the exploitation of the project outcomes (increased use of demonstration models and experimental prototypes).