

EXECUTIVE SUMMARY

The IDEA project (Indicators and Data for European Analysis) addressed a key issue both for research and policy-making with respect to innovation. This issue is the existence, availability and adequacy of statistical information. Our ability to understand the complex structure and dynamics of innovation processes, and our ability to design policies to support innovation, depend on an adequate empirical grasp of the extent and nature of innovation activity and its outcomes.

Until very recently, however, we have had to use indicators for this field which were partial and/or indirect, and this has limited the abilities of researchers and policymakers to formulate well-designed theories and policies.

Against this background, the objective of the project has been to undertake policy-relevant research on the conceptual foundations and empirical usability of existing science and technology indicators, and on the potential for new indicators that might expand our understanding of key issues in innovation and the knowledge-based economy.

The project had three main components, as follows:

First, a component on direct input and output measures of technological and organisational innovation and on the development of new concepts, methods and techniques of innovation indicator development.

Second, a component on the use of existing indicators for policy purposes.

Third, a component on the development of six new sets of indicators in areas of theoretical and policy concern.

Before turning to a brief overview of these research activities, we should outline the links seen by IDEA researchers between indicator research and policy issues. In the view of the IDEA researchers, innovation indicators should provide information that can meet three requirements:

Directly assist the development and implementation of policy actions. The need for indicators to *directly* assist policy means that the policy significance of each existing and potential indicator needs to be carefully scrutinised. Some indicators could appear to be relevant to policy, when in fact the results could be of little value because political and economic constraints make it highly unlikely that the policy action would ever be implemented. For this reason, the policy value of specific indicators needs to be carefully scrutinised. This requires a good understanding of the policy context, consisting of the existing menu of policy options and the constraints on the potential for developing new policy actions.

Verify innovation theory as part of a continual process of testing and improving theories of innovation. The requirement for indicators to improve our understanding of the innovation process is based on the vital role of theory to interpret empirical data. We need indicators that

can be used to verify theory and our beliefs and assumptions about the innovation process. An example is the need for indicators to test our theories about national systems of innovation.

Assist private firms and other institutions to develop and adjust their own innovation strategies. The social and economic value of innovation indicators will be greatly enhanced if they are of direct value to innovators themselves. For example, indicators that identify best practice can help guide firms and public institutions towards more efficient methods. It is particularly important that indicators obtained from surveys of firms or institutions are of value to them. Managers will be more motivated to complete innovation questionnaires when the results offer clear benefits to their firm.

Phase One of the work programme, 'Evaluation of existing indicators and survey methodology', involved firstly an analysis of the implications of new theories of innovation and economic change both for policy and for indicator needs. Against this background, the project aimed to critically review existing indicators, to propose new areas for indicators, and to assist in the development of indicator initiatives in Europe. This project sought to make a major step forward in the concepts and statistical methods with respect to the measurement of innovation activities and innovation outputs. The *First Action Plan for Innovation in Europe* states that the efficient use of new knowledge depends on three factors: 'the ability to produce knowledge, the mechanisms for disseminating it as widely as possible, and the aptitude of the individuals, companies and organisations concerned to absorb and use it'. The IDEA report used this three-part framework to classify both policy actions and indicator issues. Against this general background of the creation-dissemination-absorption model, the report offered a detailed discussion of future issues with respect to the development of the *Community Innovation Survey (CIS)*. Thus far, two rounds of CIS (CIS-1 And CIS-2) have been implemented, and the Commission is beginning the preparatory work for CIS-3, which will probably be implemented in 2000.

Innovation surveys such as the CIS provide valuable information on the innovative activities of firms. Nevertheless, many surveys that adopt the CIS approach suffer from several problems:

- A lack of objective measures for innovative activities such as knowledge flows.
- An inability to separate innovation as diffusion from innovation as creative effort.
- A focus on highly innovative firms such as R&D performers.
- A lack of data for non-innovators or weakly innovative firms.
- General questions that fail to capture many issues of importance to innovation policy.

A failure to adequately survey the innovative activities of large, diversified firms.

The IDEA report on these issues offered solutions to each of the above issues. In terms of direct policy relevance, the project produced not only a detailed critical overview of attempts to develop innovation indicators, but also a concrete analysis of problems in the development of the innovation indicators used in the *Community Innovation Survey*. These approaches have been presented to Eurostat as the responsible commission agency, and have been discussed with its relevant policy committee.

The second part of Phase One of the work programme focussed on using existing indicators for policy purposes. This component involved the development of a *Guide for Policymakers*, which aimed to overview all available science, technology and innovation indicators and provide a sophisticated guide to their modes of use, with the objective of assisting indicator users in policy contexts. The objective of the project was therefore to assess and present the available indicators of science and technology activity and output, in such a way as to improve their use in policy contexts. The project focused on five sets of indicators, which are more or less widely used in understanding scientific and technological change. They are:

1. R&D statistics which measure inputs of expenditure or manpower.
2. Patents, which measure commercialisable new inventions.
3. Bibliometric data (on scientific publication and citation), which are indicators of basic science activity.
4. Innovation statistics, resulting from the new OECD/EU approaches to measuring outputs of technological innovations.
5. A final chapter focused on research databases produced within major research institutes, which it was felt were relevant for policy analysis. These datasets cover the technological activities of large firms, inter-firms technology alliances and cooperation agreements, and technological collaboration.

The third component of the project, covered in the second phase of the work programme ('Analytical challenges from developments in economic and innovation theory') focussed on completely new statistics and indicators. This involved the analysis of six new areas of indicators, focusing on analytical methods and/or survey instruments, aimed at extending the sectoral and functional range of existing and potential indicators, with the specific objective of a substantial improvement in our understanding of:

- the service sector
- inter-industry diversity and variety,
- system interactions and system phenomena,
- environmental technologies,
- innovation inputs
- human resources and mobility

Each of the phase two projects had common practical objectives. The goal was *either* to develop appropriate quantitative methodologies for the problem in question, *or* to develop one or more survey instruments that include the new indicator concepts.

In total, the IDEA project produced 14 reports, two of which were book-length. In terms of further dissemination, it is planned to publish two books and a number of articles in specialist journals. Reports from the IDEA project, or specific papers overviewing the entire project, have been presented at a wide range of conferences and within policy agencies; at the time of writing, approximately twenty such presentations have been made, and more are envisaged.

In general, the research undertaken in the IDEA project has policy relevance in two ways. First, there is an indirect policy relevance, since the project aims at improving information on innovation. This work is long-term, since it is multi-faceted and involves conceptual development, trial projects, empirical testing and the general process of debate, which accompanies new efforts. But there has also been a direct policy relevance for the work, since both IDEA reports and the IDEA team have been used in a range of direct policy contexts. The relevant policy forums include several Commission agencies and directorates, Member State agencies, OECD, and so on. It is also envisaged that such contacts will be extended and deepened in the future, and the IDEA team will continue for such work.