Setting Research Goals Not Enough, Says OECD

Policies to encourage more research on topics of economic importance seem to be effective only in countries with relatively strong central control over allocation of resources

Paris

VIRTUALLY ALL industrial countries in recent years have emphasized the need to focus research on topics of key economic importance. According to a report prepared by the Paris-based Organization for Economic Cooperation and Development (OECD), however, more than jawboning is required to achieve results. The report indicates that greater centralized control over the scientific community may be needed to target research effectively.

The OECD's conclusion is based on a comparison of the number of scientific papers in leading journals produced in 1975 and in 1984 by scientists from each of its 24 member states in three specific fields: biotechnology, new materials, and microelectronics. While some countries that accorded these fields a priority did show significant increases in their output of scientific publications, most revealed minimal impact.

Prominent among those that successfully increased their research outputs in chosen fields were France and Japan, both of which have established clear policies of strong government intervention in directing their research communities. Countries where, despite government encouragement, there was little or no shift in the research output of some of the fields identified for priority attention, according to the OECD, include Switzerland, Sweden, and Denmark.

Reporting these results in its *Science and Policy Outlook 1988*, the agency says that the failure to increase research output in several key areas, despite several years of priority attention, suggests that there may be "serious flaws" in the public policy mechanisms many OECD countries use to allocate resources to research and manage them.

"The area of greatest weakness appears to lie in securing the necessary consensus to ensure that designated priority areas receive the emphasis intended," says the report. "The correction of this flaw may require some reduction in the high level of autonomy of the research system and closer management to ensure that the resources provided for research are directed to the chosen priority areas."

An analysis of scientific publications prepared for the OECD by the U.S. consulting firm Computer Horizons Inc. showed that publication rates have increased in various subfields of biotechnology in the United States, the Netherlands, Australia, and Switzerland. In Germany, although chemical engineering remained strong, the number of research publications did not expand significantly in any other area. Even more markedly, both Sweden and Denmark recorded falls in outputs in several of the subfields studied (microbiology, immunology, and genetics in the case of Denmark, and biochemistry, microbiology, cell biology, and chemical engineering in Sweden).

"The output declines suggest that efforts to target biotechnology have not boosted research in some of the relevant basic sciences [in these countries]" says the report. More broadly, it points out that the total publications of all OECD countries in two subfields of research in new materials—materials science and "metals and metallurgy"—actually fell by almost 10%.

Some outside observers suggest that the picture may not be as bleak as the OECD paints it because almost all the countries covered in the survey have now accepted the need for more strategic planning for science in order to put research priorities into effect, in some cases after the data were collected.

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"Over the past couple of years, there seems to have been an across-the-board trend in this direction," says John Irvine of the Science Policy Research Unit of Britain's Sussex University. Irvine points out that even in countries such as the United States and Great Britain which claim a free market ideology, "science and technology policy is becoming much more interventionist."

John Bell, head of the OECD's science and technology policy office which was responsible for producing the *Outlook,* acknowledges that the statistics reveal several instances of major policy-driven shifts in publication patterns. Japan, in particular, has doubled its scientific output in almost all subfields of biotechnology-related basic research in the 10 years up to 1984, increasing its share in the global total of papers in biochemistry from 6.5 to 9.9%, and in pharmacology from 4.8 to 9.4%

However, Bell says that the report holds lessons for both governments and the scientific community. "We were very surprised to find that in a number of countries, publication rates declined in areas that governments had declared in their budgets to be priorities, often after spending many thousand man-hours on preparing background reports," he says. "We cannot accept that academic scientists will move into a new field just because a government says that it is important; you need to say that you are going to reallocate funds from general purposes towards specific goals."

Other findings described in the OECD report, which is issued every few years as a way of identifying emerging developments in the science and technology policies of its member countries, are:

- The percentage of scientific papers with authors from more than one country doubled for each OECD country in the period 1975–1984, and growth is accelerating.
- Italian and Swedish scientists were the most likely to coauthor papers with colleagues from another country, and scientists in the United States and Japan the least likely, although in absolute terms the publications of non–U.S. countries have more American coauthors than any other foreign researchers.
- The productivity of American nuclear physicists, measured by the total number of publications divided by the amount of money spent by the federal government on nuclear physics, is almost twice that of nuclear physicists in any other OECD country. In astronomy and astrophysics, the gap is even greater; comparing the research funds spent in 1982 to publications in 1984, U.S. scientists in these two disciplines produced 12.3 scientific papers for every $1 million spent, while U.K. scientists produced 5.1 papers, West German scientists 2.6, and Japanese scientists 1.6. The report says that this difference can be partly explained by the greater role that publications play in the United States in grant applications and scientific appointments. ■ DAVID DICKSON