

EUROPEAN SCIENCE AND TECHNOLOGY POLICY

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Keywords: European Union, science and technology policy, R&D projects, international research collaborations, scientific and technological networks, EU Framework Programmes, R&D Funding.

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Summary

The article shows the principal components of the European policy in research and technological development. The first part exposes some aspects of the international context. The second part examines the processes of formalization and implementation of the European research programs with a brief overview of other multilateral cooperation programs which exist in Europe. The third part details the "Framework Programmes" (FWP), their funding mechanism and the structures it has created. The article reviews the thematic changes that have been underway since the 1980s. In the fourth part a general balance is proposed of strength and weaknesses of the European research action. Major changes and perspectives are the subject of the conclusion.

1. Introduction

The wide range policy action of the European Union (EU) in research and technological development (RTD) is rather recent. It dates back to the 1980s. Nonetheless, the history of community research, as well as the constitution of the European Community, is a large process of growth and maturation where new domains are introduced, along with the progressive growth of allocated resources.

The implementation of the 1987 Single European Act was an essential step in this process. It legitimated the European dimension of science and technology, making RTD an area of new competence for the EU, along with other sectorial policies. The major objective in the policy action was “reinforcement of the scientific and technological basis of European industry in order to develop its international competitiveness”.

Although it still occupies a small fraction of the total EU budget (around 4%), the RTD budget has constantly been growing in recent years in absolute terms.

Compared to member countries, resources for research are still rather low in the European budget: it only represents 5% of the total civilian research expenditure of all member states. The primary basis for research expenditure is still national rather than European. The total sum of support for different European international ventures in R&D (be they community or inter-governmental) does not exceed 17% of total national expenditure on R&D.

Support of the EU towards research might appear as modest, but it is necessary to keep in mind that the support given to projects by the EU is in the form of “incentive credits”, i.e. sums of money that do not imply heavy equipment funding and represent additional funding to already existing structures. EU funds are not “subsidies” to research organizations and companies, and may only be used for carefully described work or research developments. Compared to other types of public investment, these funds are immediately used on research activities, whereas most public expenditures are investment in fixed costs and are used for salaries and infrastructure. Moreover the EU funds around 50% of the total cost of projects (“shared-cost projects”). This means that the volume of R&D generated by these actions is at least twice as large as the amounts listed in the community budgets.

In most industrialized countries, since the mid 1980s, the slower growth of public and private funds allocated to R&D has been compensated by the growth of external funds. Thus the support brought by the EU has had an important impact on national research and development.

Most evaluations done in recent years tend to show a globally positive image of the last 15 years of EU action in this area: community programs have an important impact on research in the continent and create a specific added value, namely the “Europeanization” of research. To put it differently, there has been a large development of transnational networks in RTD which have opened national scientific communities and have re-inforced common projects between academics and the industrial world, which were previously poorly developed in Europe.

Apart from the insufficient resources, the most evident gaps concern the absence of an industrial strategy, the administrative methodologies and the complexity and length of legal and institutional procedures. These limits point to the main difficulties of European research: its insufficient capacity to translate research and technological advance into viable industrial projects and the very feeble coordination of actions between the national and community areas.

The European Union is going to be enlarged to 25 or 30 countries in the twenty-first century. This demands more appropriate methods than the ones used up to now. New measures and modifications have been introduced in the pluriannual programmes directed towards this enlargement.

2. The international context

In a context of growing costs for research, governments have more difficulty in maintaining their funding levels for R&D. On a world scale, public funds have stabilized or diminished in real terms since the early 1990s.

In most OECD countries, the 1980s were characterized by a slowdown of funding for R&D—a trend, which has been accentuated in the 1990s along with the appearance of economic recession. National S&T policies have been geared towards economic competitiveness and growth, by focusing on industrial research and by reinforcing interfaces between industry and universities.

One of the principal trends of the last decade has been the growing participation of international funds in R&D expenditure (foreign companies as well as foreign states and international organizations). International cooperation assumes great importance in public R&D budgets, notably so for European Union member states. Even industrial R&D in the 1980s received a growing amount of foreign funds. This overall growth of external sources has partly compensated for the loss of funds provided by firms.

Most national policies want to encourage the internationalization of their national scientific and technological potential. In the EU these measures range from the simple exchange of researchers to the more complex establishment of multilateral cooperation agreements, including cases such as the creation of international research institutions (e.g. CERN, the European Laboratory for Particle Physics).

The promotion of “common interests” in the scientific and technological domain has been associated with the fear of a European decline relative to other economic potencies. This has been the principal engine behind most decisive community measures in favor of RTD, which were legitimized by a consciousness in the European industrial world of growing gaps with USA and Japan.

In the 1980s, most cooperation activities in the European Union have been done in the promotion of industrial competitiveness. In high technology sectors, the competitive position of Europe as compared to other members of the “Triad” (European Union, USA and Japan) has been deteriorating. The USA is ahead of Europe in the majority of the so-called “critical” technologies, both in terms of results and potential evolution. Moreover, in some sectors (electronics and semi-conductors), Europe is behind Japan.

As far as scientific research is concerned, indicators show that basic research is growing as compared to other types of research. But industrial research is slowing down in some major economic sectors for Europe. High technology products in the EU represent only 30% of exports whereas this percentage is more than 50% for Japan and USA. R&D expenditure by private companies is higher in Japan. Additionally industrial R&D in

Japan is almost not supported by public funds, whereas in USA, 28% of industrial research is linked to public contracts (mainly military) and the equivalent figure is more than 18% in the EU.

All global indicators in Europe show a gap between basic research and technological development and between innovation performances and competitiveness. They are the result of three main deficiencies of the European research and technological development system:

- Insufficient transformation of research results into applied commercial results (new products, new processes and services). Europe seems to have a comparatively limited capacity to transform its scientific and technological discoveries into industrial and commercial successes.
- Fragmentation of effort and lack of coordination of research actions and programmes, at both European and national level. A “Unique Europe” is still not a process that is completed, and the structural support that exists in Japan and USA is still lacking in Europe since what could serve as a “national” framework is still not totally defined.
- Insufficient R&D efforts, mainly in the domain of education and research training, and in knowledge transfer and dissemination. This is particularly true with enterprises where efforts are still limited.

Insufficient investment in research and development plays an important role in this context. Europe’s efforts are lower than its competitors. The R&D expenditure of the European Union is lower than the USA in absolute terms. It is also lower than Japan’s when considered relative to Gross Domestic Product (GDP). The mean research effort of Europe is only 1.94% of its GDP against 2.80 for USA and 2.98% for Japan (as estimated by EC-Eurostat for 2001).

Nonetheless, insufficient funding is not the only aspect of Europe’s decline in this domain. Many other factors have to be added. Among the more obvious ones we have to consider:

- poor management of commercial issues;
- inadequate organizational structures and training in companies;
- isolation of research teams and lack of coordination, and
- feeble cross-border exchanges between European countries.

Europe has difficulty in integrating R&D and innovation in a global strategy. More efficient management of research and technology in European firms is considered a necessity by the European Commission.

The idea of more systematic European cooperation in research and technology has been progressively accepted by scientists, industrialists and political leaders. Since the launching of the first large European programme with industrial aims (the *ESPRIT* programme in 1983, in the information technologies) a long-term European policy has been forged. Up to the 1980s, nearly all research and technology development actions were funded by community funds but executed nationally. After the 1984/85 framework, multi-partnership technological programmes, transnational cooperation, and

inter-firm collaborations were encouraged. This has now developed into a multinational framework.

3. Formalization and implementation of the EU research policy

3.1. Evolution and legislative framework

The first aspect that distinguished European RTD from similar multilateral systems was its position in the complex institutional setting that defined by the Treaties establishing the European Communities and the European Union.

For a long time, apart from the ECSC Treaty (establishing the European Coal and Steel Community) and the EAEC Treaty (establishing the European Atomic Energy Community), most action of the communities in the scientific and technological domains was only referred to in one single article of the Treaty of Rome (March 1957) that established the European Economic Community (EEC). With the exception of agricultural and fisheries research, the EEC Treaty had no provisions for common research activities. Thus, until the 1980s, most community action in this domain was taken without any clear legal authority and had very limited power.

The institutional framework on RTD has been defined by two major moments: the Single European Act (1987) and the European Union Treaty (or Maastricht Treaty, 1993). Both treaties define general guidelines and principles for S&T actions, and introduce S&T action in the European political context.

The Single European Act provided great motivation and added impulse to the launching of a common research policy since it aimed at the creation of an “internal European market”. It extended the competencies of the Community and introduced significant changes in the functioning of institutions. The Single European Act explicitly legitimized the regional dimension of S&T cooperation in Europe. It gave RTD a formal area of competence through the community institutions. A new chapter was integrated into the Rome treaty, on “Research and Technological Development”, in which objectives and means were defined.

With the Maastricht Treaty (which became effective in November 1993), community research received a more political dimension. The treaty opened new possibilities and obligations aiming at enlarging the objectives of research. Added to the industrial finality, research was called to accompany “collective” objectives and integration with other policies, for all countries in the Union.

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Biographical Sketch

Regina Gusmão has a PhD in “Science, Technology and Society” from the Conservatoire National des Arts et Métiers (Paris, France). Her thesis on the participation of Member States in European Research Programmes was carried out and published within the French Observatory of Science and Technology (OST), where she was in charge of projects for seven years. At OST she developed special competences in production and diffusion of a large sample of indicators concerning international S&T cooperation and multilateral research programs.

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