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An EC-Framework for Scientific Research and Technological Innovation

by Guido Brunner, Brussels *

Science and technology have come under the fire of critics over the last ten years or so, but the present situation of mankind will call for more, and not less, human ingenuity. A particular problem for Europe to master is the need to improve the channels for translating scientific achievements into competitive engineering and technology. It is a problem which can best be solved within a coherent policy framework, designed and implemented at Community level.

The 1st January 1978 marked the 20th anniversary of the entry into force of the Treaty establishing the Common Market. The gradual process of forming a Community was initiated in order to guarantee the internal and external freedom of the people of Europe and to promote lasting economic and social progress. The approach chosen started with the economy, but the aim had always been broader than that; the final objective was the political union of Europe.

Present Achievements

What has been achieved since then becomes clearer when comparing the present situation with the conditions prevailing at the foundation of the Community. At that time Europe was to a large degree politically and economically dependent on the United States of America. There were very few common interests and every state pursued its own objectives using whatever means were at its disposal. Economic development was held back by trade barriers; free movement of workers and business, capital and goods was in its infancy.

Today there is a great measure of cooperation in all areas. The Member States reach joint political discussions under European political cooperation. More and more they speak with one voice at international conferences, such as the CSCE and the North-South-Dialogue. The cornerstone of integration is and remains the Common Market. Trade is now completely liberalized from barriers and discriminations. There is free movement of workers and of business. The unrestricted exchange of market forces has contributed to a

unique economic upswing. The internal trade of the Community has increased tenfold, its gross domestic product fourfold. Today the Community is one of the most highly developed regions in the world.

Of course, the oil crisis as well as the following economic and currency crisis have not left the Community unscarred but today it is commonly agreed that it has been an extraordinary achievement by the Community that Europe has passed through all the dangers of the oil crisis, the recession, unemployment, and monetary upheaval in a basically sound condition.

In the face of all these problems the Community has still enough dynamism to strengthen its inner cohesion. The European Council has set the date for the direct election of the European Parliament. It also agreed in Bremen in July 1978 to attack anew the problem of economic and monetary union. The impact of the Community is just as clear in the external sphere. The cooperation with the developing countries under the Lomé Convention is widely regarded as a model. The most impressive evidence of the attraction of the Community, but also one of the greatest challenges it has yet to face is the enlargement towards the South.

The Community, because of the size of its population, the amount of its Gross National Product and the contribution of its international trade is today the most important regional grouping of the world. A growing part of its wealth originates from technical progress, which in turn depends

* Member of the Commission of the European Communities.

Table 1
Research and Development Inputs

Year Countries	1971		1975	
	Gross Nat. Expend. Research & Development mn \$	Scientists & Engineers on Research & Development	Gross Nat. Expend. Research & Development mn \$	Scientists & Engineers on Research & Development
EUR - 9	12,000	256,000	24,000	230,000
USA	27,000	540,000	34,600	533,000
USSR	14-16,000	700-780,000	17-22,000	900-980,000
Japan	4,000	198,000	8,800	260,000
China	1,500-2,500	50-100,000	3-4,000	100-200,000

Sources: OECD, UNESCO.

on education, research, innovation, management and technology exchanges. These are crucial areas which do not easily lend themselves to quantification. A comparison of indicators of research and development inputs (Table 1) and outputs (Table 2) indicates that the Community as a whole is the second largest producer and

Table 2
Research and Development Outputs

Year Countries	1971			1976			1974
	Scientific authors	Nat. patent applications (residents)	Productivity manuf. (output per man-hour) 1967 = 100	Scientific authors	Nat. patent applications (residents)	Productivity manuf. (output per man-hour) 1967 = 100	
EUR - 9	51,000	84,600	122	89,500	74,500	143	
USA	92,000	71,000	115	156,000	65,000	129	
USSR	17,000	124,000		24,000	128,200		
Japan	8,000	78,400	151	16,000	135,700	200	
China	-	-		-	-		

Sources: WIPO; ISI; US Dept. Commerce.

user of science. The two tables should, however, not be considered as containing figures of absolute magnitude, but rather as tentative attempts of throwing light on trends which, *inter alia*, show the dynamic progress of technological development in Japan.

Further prosperity of the Community will depend on its development of scientific and technical know-how. Science and research have a key role to play if the Community wants to maintain its economic competitiveness and if the Community wants to secure its supply in energy and raw materials. These are of course well known facts. The shaping of a Community research policy was and still is nevertheless a long and difficult process.

The Community research started with the Euratom Treaty in 1958. The concept of the Euratom Treaty was that the Community should help to

build up nuclear industry. Nuclear research was in this context of particular importance. The Joint Research Centre with its institutes in Italy (Ispra), Belgium (Geel), Germany (Karlsruhe) and Holland (Petten) was created. Further Community funds were used to support nuclear research in the Member Countries. The weakness of this concept was its restriction to nuclear energy. The nuclear enthusiasm of the late fifties and early sixties had led to the creation of an over-capacity in nuclear research throughout the Community. Member States which had their own considerable nuclear research potential were tempted to protect their own nuclear research at the expense of the Joint Research Centre. This led to the severe crisis of Euratom in the years 1967 to 1972. Community funds were reduced, scientific personnel was cut. Instead of long-term perspectives only yearly crash programmes of little scientific value marked the situation.

Fortunately this dark area belongs to the past. Community research is well on its way. The Paris Summit of October 1972 made this change possible. The Summit agreed to develop a coherent common science and research policy. The Council of Ministers, on 14th January 1974, adopted a series of Council Resolutions on an outline programme in the field of science and technology.

In this field the Community has set itself the following four main tasks:

- ☐ defining and implementing programmes of research in support of common sectoral policies;
- ☐ providing a public service for activities of common interest relating to research and development;
- ☐ launching initiatives in the broad area of innovation and growth;
- ☐ coordinating national research policies and concerting research cooperation with third countries.

Research Programmes

Research activities at Community level are intended to support the Community's sectoral policies, such as energy, environment or agriculture, and at the same time help to clarify the objectives of new sectoral approaches, such as "raw materials" or "social issues". Common research programmes and projects aim at a number of broad objectives which the Commission has identified for the remainder of the seventies, as follows:

- ☐ the long-term supply of resources (e.g. raw materials, energy source materials, agricultural produce);

- ☐ the promotion of internationally competitive industry;
- ☐ the improvement of living and working conditions;
- ☐ the protection of the human environment and nature.

In 1978, 194 mn European Units of Account¹ (EUA) will be spent from the Community budget for these common research programmes. The research and development programmes currently in progress have together a financial volume of 800 mn EUA. Although this represents only 2% of the total research and development expenditure of Member States it still means a considerable step forward. Since 1973, research efforts at Community level have been more than doubled. To this should be added projects with specific financing, such as the development of new oil and gas technology, or research on coal and steel. The Community is also working by pooling all available resources (whether national or international) into common efforts (for example, JET, the fusion demonstration experiment in the United Kingdom or the solar electric prototype under construction in Sicily).

A key role in the research and development efforts of the Community is played by the Joint Research Centre. The Centre has a staff of about 1,000 scientists and engineers. Its current research and development programme is funded with over 390.7 mn EUA and concentrates on three topics: energy, environment and public services. The main tasks of the Centre are:

- ☐ to execute research and development programmes of a "central nature" (e.g., activities calling for a central facility, such as the European Solar Test Installation),
- ☐ to perform a public service role (e.g., in reactor safety research),
- ☐ to provide the Commission's services with the required scientific and technical underpinning, and
- ☐ to contribute to cooperation in training and research with developing countries.

Public Services

The Community offers an extensive framework for providing public services related to science and technology. Activities, such as training of scientific workers, scientific and technical information, testing, standardization and certification of materials, as well as patent and licence work, can be and are usefully promoted at Community level as a public service for all users. A good example is the European On-Line Information Network (Euro-net), a service being implemented by the Com-

munity to provide users with direct access to scientific, technical and socio-economic data and to integrate existing and developing on-line information services into a commonly shared network. Similarly, the Joint Research Centre — as an independent research organism — can provide government organisations, industry and universities with equipment, know-how, products and specialized services which do not need repetition at national level.

Innovation and Joint Exploration of the Future

The principal source of economic growth in mature economies is technical innovation. Only innovation can bring about the radically new products, processes and services we need for generating new employment at home and opening up new markets abroad. Optics, electronics, computers, automation, telecommunications, scientific instruments, synthetic materials, transportation, aeronautics, microbiology, molecular biology are examples of these new areas of endeavour. Others include conservation and recycling of raw materials and of energy source materials, anti-pollution technology and protection of the human environment, health, medicine, foodstuffs, etc. But innovation is also needed to create new, specialized growth points in older or declining areas, whether in the fibre, textile and clothing industry, in shipbuilding or in steel. Innovation contributes, through constant growing improvement, to the competitiveness of the engineering sectors (electrical engineering, mechanical engineering, chemical engineering, construction technology, and others) which constitute the basis of our economies. That is why the Commission has been studying, since last year, a series of possible areas to be approached in common (including valorization of research results, venture capital, fiscal practices, collective industrial research, flow of technology, information and advisory services, aggregation of needs and markets, patents and licensing, etc.).

Coordination of National Research Policies

Coordination is a permanent task aiming at minimizing the divergent tendencies within the research systems of the Member States in order to improve efficiency, reduce costs, share risks, pool experiences and foster division of labour, specialization and exchanges.

Coordination involves analysis and comparison of objectives and means, review and evaluation of results, harmonization of procedures, identification and filling-in of gaps and reduction of useless duplications. It is a difficult task, but a very

¹ 1 Unit of Account = DM 2.55
1 Unit of Account = US \$ 1.31

important one, especially taking into account the order of magnitude of research and development expenditure publicly financed each year by the Member States (7,234 mn EUA for the year 1976). Progress has been achieved in medical and energy research. Further promising efforts are under way, especially in the latter sector.

The Community, as the largest trading area in the world, has a permanent interest in exchanges and collaboration with its partners. This is certainly true in the research and development area, where benefits from international cooperation can be derived by all partners. This applies to our relations with other European countries, such as Portugal, Spain, Greece and Turkey; with major trading partners, such as the USA, Canada, Japan and the Arab world; with the Member States of the Lomé Convention; with other developing countries and even with centrally planned countries in Eastern Europe and Asia. The Community has a responsibility to exercise in several important international fora, such as the UN family and the OECD, to mention just two. It seems important that Member States should pursue common policies in all inter-

national discussions affecting research and development activities.

Science and technology have come under the fire of critics over the last ten years or so, but the present situation of mankind will call for more, and not less, human ingenuity. This is, incidentally, also the view obtained from a public opinion poll held in 1977 within the Community. To promote our economic and social well-being, to economize material resources, to protect the natural and human environment, to reduce suffering and illness, to enhance culture, education and leisure, we shall need more and better training, more long-term research and more dynamic innovation and exchanges in technology. A particular problem for Europe to master is the need to improve the channels for translating scientific achievements into competitive engineering and technology. It is a problem which can best be solved within a coherent policy framework, designed and implemented at Community level. The Commission in Brussels will continue to provide its leadership for common progress in the complex path leading from research to innovation.

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**EINFLUSS MULTINATIONALER UNTERNEHMEN
AUF AUSSENWIRTSCHAFT UND BRANCHENSTRUKTUR
DER BUNDESREPUBLIK DEUTSCHLAND**

(The Influence of Multinationals on West Germany's Foreign Trade and Industrial Structure)

The present study examines for the first time comprehensively to what extent the multinational corporations influenced the German economy's structural change and how far they had effects on the competitive situation and the allocation of resources within the individual industries. Moreover, the study analyses the extent to which volume, direction and composition of the German external relations are being determined by the multinationals' activities (in German).

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