



COMMISSION OF THE EUROPEAN COMMUNITIES

European perspectives

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The Old World and the new technologies

Preface by Guido BRUNNER

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The Old World and the new technologies

Challenges to Europe in a hostile world

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Préface

We are living in an age of increasing uncertainty, and its dangers are no more clearly demonstrated than by the energy issue. Forecasting is more necessary than ever as we have to take decisions today that will condition the future.

The report 'The Old World and the new technologies' attempts to identify the future prospects and problems that could affect the long-term development of the Community. As one of the first products of the FAST programme, it considers today's and tomorrow's problems in the areas of energy and employment, together with two developments which could radically transform our society in the coming decades: first, the increasing need for information in our society, and the ability of new electronic technology to satisfy it, and second, the revolution in the technological application of biochemistry.

It is clearly vital for Europe to develop its technological potential if it wishes to shape its own future in an increasingly dangerous world: that is the central message of the report. We in Europe must take up the challenge of the new industries. We are dependent on outside sources for 55% of our energy and 75% of our raw materials. Our major resource is our skill. We need to make an enormous technological effort to safeguard our economy and political independence.

The play of market forces has in the past entailed substantial technological progress but the market alone will be insufficient to meet these new challenges. The long delays and the vast scale in new investment projects, combined with rapidly changing needs for new skills which only State education can meet, require a more active approach than in the past to encourage faster technological development. One example is the promotion of new sources of energy, which are an essential factor for growth and offer a way of cutting down European oil imports.

GUIDO BRUNNER

Member of the Commission of the European Communities

Foreword

In a décision of 25 July 1978, the Council of Ministers of the European Communities assigned several objectives to the FAST programme. The main one was 'to highlight the prospects, problems and potential conflicts likely to affect the long-term development of the Community and to define alternative courses of Community research and development' in order to help solve the problems or to bring the prospects nearer to concrete realization.

The présent work is therefore a wide-ranging assessment of the challenges facing Europe. This is in fact the underlying principle on which the FAST team has based its research programme.

The report begins by evaluating the changes that have taken place since we left the 'old' world to enter the 'new' at the start of the 1970s. We have devoted particular attention to the crises and challenges facing Europe in the économie, industrial and energy sectors.

In addition, in view of the internal and external changes that are taking place, it was necessary to examine the question of the decline and renaissance of Europe. The increasing disparities between European countries could shake the foundations of the Community and this considération has led us to try to establish a diagnosis as to what are Europe's strengths and weaknesses as it prepares to confront the challenges of the future.

The final section of the report examines the prospects for technological development and advance, the mastery of which will determine Europe's capacity to meet these challenges successfully.

This foreword would not be complete without the following comments:

- the conclusions of this report are not in any way to be interpreted as recommendations emanating from the European Commission: they are the sole responsibility of the authors, who have no other pretension than to stimulate discussion.
- the object of this report is not to propose specific lines of approach for R&D, but rather to sketch the general environment within which FAST needs to define its own priorities with a view to putting forward alternative orientations for research and development. Since the future remains open and uncertain, this report cannot be a closed book; it will be supplemented, augmented and updated in parallel with other work done by FAST.

- this work could not have been done without access to the results of work carried out by the Interfutures¹ group, by the Europe 2000 group within France's Commissariat général du Plan, and by the Directorates-General of the European Commission itself. In this last category, we would like to thank in particular the various departments of the Directorate-General for Economic and Financial Affairs for their support as well as for their stimulating comments.

¹ Interfutures is a prospective group within the OECD which worked for four years (1976-1979) under the direction of Jacques Lesourne and which published in 1979 the report *Facing the future, mastering the probable and managing the unpredictable*, OECD, Paris 1979.

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Chapter 1: Challenges to the old order

'Billions of years ago the retreating seas ineluctably cast hundreds of thousands of aquatic créatures on the newly formed shores. Deprived of their normal environment they died, gasping and fighting for one last second of eternity. Only a few of them, happier and better adapted to an amphibious existence, overcame the shock of change...'

'... Those who can adapt themselves will do so; those who cannot manage this will survive in some way at a lower level of deveopment or will perish, thrown up on the shores.'

Alvin TOFFLER in 'The Future Shock'

1.1. Relative décline and the qualitative limks to growth

1.1.1. The magnitude of the décline

A rate of growth double that of today, unemployment at a third or a quarter of présent levels, and price inflation of a few per cent each year. This is the image of the 'paradise of the 1960s' which the nine countries of the Community, like the other industrialized countries, hâve lost and which they are far from regaining:

- *Slow growth.* The average rate of économie growth in 1979 was 3.3% as against 1.8% per year during the years 1974-77, but 4.6% per year between 1960 and 1970.
- *Worsening unemployment.* There are now, on average, 6 million unemployed, as against 2.1 million between 1960 and 1970.
- *High inflation.* Priées rosé by 14% on average between the first quarter of 1979 and the same period in 1980. The average between 1958 and 1967 was 3.3% a year.
- *International constraints are more severe.* Compétition with the United States and Japan is increasing and hew competitors from the East and the South are appearing. At the same time we need to export more to pay for more expensive raw materials. The international monetary System is in flux, buffeted by spéculative movernents of capital and rapid changes in rates of exchange. The commitment to free trade on which the post-war prosperity was built is eroded by controls on trade, and overt threats of full-blown protectionism.

1.1.2. The qualitative limits of growth

Whatever the considérable benefits of growth, it is not the sole barometer of happiness. The satisfaction of material wants is sometimes at the cost

of pollution, waste, overcrowding, gigantism, uniformity and loneliness. There can be a lack of creativeness, individual fulfilment, and respect for nature.

The growth of the 1960s stored up problems which have undermined the consensus on which it was based. Our societies have gradually become aware of the qualitative limits and of some of the harmful effects of growth:

- threats to the quality of the environment (pollution of water, air, soil and sites) and the exhaustion of some finite resources;
- more people living in towns and cities;
- ~ greater inequalities between the beneficiaries of growth and those left behind in declining industries, skills and regions;
- increasing waste (energy, creaming-off of mining sites, products which do not last);
- the damaging effects of some innovations (dangerous products, high-risk technology);
- the division of labour, mass production and automation have reduced the fulfilment many people achieve from their work.

These qualitative limits of growth (ecological and human) are compounded by *quantitative limits* (physical resources and saturation of markets.)

These trends have deepened the present recession which now appears to be much more structural than cyclical. Only the capacity of our economy and social systems for change will allow us to regain a new development path.

It is probable that the rapid growth of the 1960s increased inequalities (between rich countries and poor countries, but also within countries). But the real question is how, in the presence of inequalities, to respond to legitimate social aspirations such as the right to work, to health, to education, to security and to justice, just at the time that slower growth provides fewer resources and, consequently, less room for manoeuvre for governments.

1.2. Criticism of the conventional wisdom

1.2.1. Changes in values

Of course, more does not necessarily mean better. It is a pity if the aspirations listed above most frequently arise in the form of material

claims. In the sorting section of the French Post Office, for example, workers claim improvements in wages and traditional working conditions, when their main complaints are in fact of a qualitative kind - lack of creativeness and fulfilment.

A major change in values might, paradoxically, have occurred during the growth years which is at the more difficult to satisfy in the recession which it has in part engendered. At least this is what the Interfutures experts seem to suggest.¹

*In short, recession holds back the change in values which might be needed for faster adjustment.*² However, necessity makes its own law. In the absence of high growth, we need to adapt to a lower rate of growth while modifying the qualitative content of technological, economic and industrial development. (e.g, shorter or more flexible working hours, new life and leisure styles, greater involvement with the end-product of work).

This new consciousness is more accentuated in the *younger groups* of the population (groups which were relatively more numerous during the 1960s than during the previous decades). It is displayed in the phenomenon of 'drop-outs', and by the appearance of pressure groups (environmentalists, ecologists, feminists). Both tend in the medium-term to reinforce *post-materialistic values*. Individuals and groups ask for changes in technologies and in behaviour (for example, by rejecting hierarchy decision-making). We should not underestimate these changes in values, expressed either in new attitudes to work or, more worryingly, in phenomena such as drug-taking by the young.

1.2.2. The Welfare State and representative democracy

In addition, there are several contradictory shifts of values — between the desire for freedom and the desire for roots and security, between fulfilment in work and the desire to escape responsibilities. This latter point raises the question of the Welfare State. The State can do anything; it owes us everything. But has it not also repressed individuality and established a reign of uniformity in mass production and mass culture?

Recourse to the *Welfare State* to meet demands for health and education and to reduce unemployment or inequalities just when economic growth is slower than before, has increased the proportion of our national income going into public spending. And from this heavier tax burden has grown a new revolt against tax paying, at its clearest in California and in

¹ *Facing the future, measuring the probable and managing the unpredictable*, OECD, Paris 1979.

² This is the hypothesis put forward by Interfutures.

récent political campaigns in Britain, Belgium and Ireland. This trend could ultimately precipitate State bankruptcies.

The increasing rôle of the Welfare State also meets counter-pressures from social groups which organize themselves to negotiate with the State and with other groups.¹ So the increasing rate of State intervention is counter-balanced by a restriction on its freedom of manoeuvre, making it difficult for the State to use its resources effectively in either the économie, monetary, social or legal fields. This results in a paradox of increasing State influence with decreasing State efficiency.

The State is less governable, but not only at a technical or bureaucratic level. The efficacy and credibility of the traditional instruments of représentative democracy are also reduced: do Parliaments still exercise a real power over the major décisions affecting the life and future of their nations? Is a vote every four or five years still the best instrument for measuring and expressing the 'wishes of the people'? If it is the best expression of democracy, why is there the trend, imported from the United States, to sound out public opinion at ail times and on ail subjects with opinion polls? Do the political parties still involve their members and other citizens in the choice of the major poicy options for their countries?

1.2.3. Mass information and culturaï needs

The world is a smaller place. New and speedier forms of transport hâve given us greater freedom. But paradoxically many people resent becoming passive receivers of information, and the sensé of isolation and anonymity which can result. Many feel that they no longer participate in culturaï activities, but only consume cultural products produced by others. Partly as a reaction to this aliénation, there has been an explosion of local and free radio stations, of a local 'underground' press, and of anti-establishment sub-cultures.

1.2.4. New technologies suspected

Behind ail thèse questions about growth lie even more about technology, since the history of progress is, partly, that of the extraordinarily fertile marriage between science and society through technology. We can debate this subject at length. It is necessary, however, to indicate the disturbing coincidence between the questioning of growth as an objective

¹ This is what Tuerfulurcs terms the 'oligopolization of social life'.

and the doubts about new technology (such as opposition to nuclear power) which some would explain by the 'decreasing returns to technology' — a thème which we develop later.¹

Social attitudes towards science and technology seem to have changed. The scientific world has been respected and venerated since the industrial révolution. But the shock of Hiroshima seems to have introduced an unprecedented public ambivalence. The new technologies can also be feared and suspected.

Political events, such as the war in Vietnam, fed this conflict between scientific neutrality and socio-political responsibility. And today the debates over nuclear energy and bio-genetics demonstrate the public worries.

1.3. Questions for Europe

Several questions arise for Europe from this analysis:

- Is the *stower* growth in the 1970s a harbinger of prolonged recession, or is it a necessary *transition* to a new System of values, and another development model?
- Was the growth of the 1960s as wonderful as one imagined? We tend to gild the past and forget unhappy memories. It was after all during the 1960s that we failed to forecast and prepare for the crisis of the 1970s.
- Can the Welfare State provide security and meet the individual's aspirations for more fulfilment, responsibility and security?
- Will the new technologies be accepted by society, and will they meet its aspirations?

In order to seek answers to these questions, we must re-examine the origins of the present stagnation. Our reflections now centre on an économie analysis, even if the économie déterminants do not tell the whole story. From this point of view we will analyse:

- the crises: the origins, conséquences and challenges for Europe;
- the déclin and renaissance of Europe;
- a crisis of confidence in growth and science;
- the major technological changes in the next few décades.

¹ See Orio Giarini, Henri Louberge: *La civilisation, technicienne à la dérive*, Dunod, Paris, 1979.

Chapter 2: The crises: The origins, conséquences and challenges for Europe

2.1. The origins of the crises

The causes of the crises have mostly sprung from the high rate of growth of previous decades.

2.1.1. The disturbances born of the Second World War

The Second World War redistributed political and economic power and profoundly changed the world context. Amongst the principal changes:

- *the division of the world* into two zones of influence. *The United States* found itself in a position of uncontested economic domination, despite its political opposition to the Soviet Union. Peace was only assured as a result of a balance of fear, which, however, did not prevent the superpowers from proxy fighting by means of smaller powers. This influence was exercised through military organizations (NATO, Warsaw Pact) or through economic organizations (GATT, IMF, and Comecon.)
- *decolonization*, with the emergence of a new sovereign group of actors on the international scene, at the Bandung Conference in 1955.
- *a technological leap forward*, in many fields: electronics, metallurgy, organic and physical chemistry, transport applications, telecommunications, health and synthetic materials. There was major progress in the management and control of large-scale production units. An enormous fund of techniques were thus established, primarily for military ends, which was then used in other fields (such as nuclear energy).
- *the internationalization of production*, which entailed the further concentration of economic power.
- *a demographic impulse*, due to the 'baby-boom' in Europe immediately after the war, which was followed by a much higher birth-rate in the industrialized countries than before the War. This change in the age structure resulted in economic bottlenecks at various levels, which generated tensions.¹

2.1.2. The instruments of growth

At an economic level the immediate post-war period saw the establishment of a series of bodies, under the aegis of the United States, which

¹ For example the population of working age in Europe has increased *three times more rapidly* since 1975 than between 1955 and 1975.

were designed to help reconstruction of the Western economies after the War. *First, there was the création of an international monetary system based on the dollar, which was accepted as the reserve and seulement currency. In 1948 the USA held three-quarters of the "world stocks of gold. Secondiy, the West committed itself to the liberalization of international trade, by removing customs barriers. The System was founded on principles of non-discrimination between member countries and reciprocity. Thirdly, the Marshall Plan organized American économie and financial assistance.*

Thèse mesures promoted stability, which in turn favoured économie growth. Economie and financial relationships were extended on a world level. Multinational companîes and the banking system sprung up as never before. The American economy became the model for the recovery of Europe. Technological progress and the fund of innovation which was available made it possible to satisfy an expanding market at decreasing costs. Growth fed itself. The liberalization of trade, by increasing the size of markets, favoured économies of scale whilst high productivity made capital accumulation and profits possible on a large scaie. This in turn encouraged investment especially in consumer goods. Demand was sustained by increasing population and by government, and supply by abundant immigrant labour.

Another vital factor in growth was the *access to cheap raw materials*. Technical progress in production and in transport cuts costs. At a political level, concessions such as the abandonment by States of sovereignty over their own resources, in favour of receiving royalties, also ensured trouble-free supply. The influence of the State increased steadily. The war effort, followed by reconstruction, demonstrated the need for a director for large-scale projects. This Welfare State¹ began to develop monetary, fiscal, budgetary and social policy with more or less success.

This évolution depended also on the growing influence in decision-making of trade unions and other interest and pressure groups. Thèse groups helped to establish a social *consensus* on the objectives and organization of society, including the rôle of the State or the judiciary in the control of conflicts. The consensus also encouraged new technology in the race for exponential growth.

2.1.3. The beginning of breakdown

At the start of the 1970s, the objectives written by the United Nations into the international development strategy were based on the assump-

¹ Interfutures cites Bell, who recalls that the State is chargée! with three new fonctions: support for development, macroeconomic régulation and a 'normative social policy' intended to 'correct the conséquences of al! the économie and social inequalities'.

tions that the developed countries would, together, maintain the same rate of growth as during the 1960s, and that the terms of trade with the developing countries would hardly be changed. Needless to say, these assumptions proved fragile. They extended into the future the results of the past, whereas at a geopolitical level the international environment had changed profoundly with the emergence of the Third World. At the economic level the influence of Europe and Japan within the Western economy also increased to the point where it was possible to speak of a relative American decline.

2.1.3.1. *The relative decline of the United States*

The share of the USA in the total GNP of the leading seven industrialized countries of OECD fell from 65% in 1955 to 62% in 1960, to 54% in 1970 and to less than 45% in 1978. Over the same period the American share in world trade fell from nearly 20% to less than 12%.

The USA remains the leading exporter, followed by the Federal Republic of Germany (11%), Japan (7%) and France (5.5%). But on current trends it will not remain so for long.

Since 1960 Japan's share of world trade has more than doubled. Europe's share has also increased so that in 1979 the nine countries of the Community accounted for more than a third of international trade (though trading between the nine makes up more than half this total). The relative American decline becomes less obvious if one takes into account the *rôle of the American multinationals*.

America's productivity is also flagging. The industrial development of Europe and then of Japan generated economic imbalances through a leapfrog effect in the use of capital and plant. The car industry is a good example of this. During the war American industry tooled up for the mass production of jeeps, trucks, and other vehicles which gave it a monopoly position in the immediate post-war years. From 1955 onwards the continental car industry, advancing from an almost 'workshop' phase of production, installed more modern productive apparatus with higher productivity than that of the USA. Then in 1965 it was the turn of the Japanese industry to emerge, with new technology and working practices so that its productivity of labour now tops the league.

America's relative economic decline has also entailed the weakening of its political leadership, which has been acutely felt since Vietnam. But the dollar continues to play a dominating rôle in international monetary relationships. It seems likely, as Interfutures has emphasized, that in the future a reduction in America's regulatory rôle in the world economic System will follow from its relative economic decline. *A weakened leadership cannot impose itself as a regulatory power.*

The persistence of the American balance of payments deficit, particularly since the start of the Vietnam war in 1965, undermined the dollar, That

in turn led to the collapse of the Bretton Woods System, whose fixed exchange rates had been based on the dollar since 1945. On 15 August 1971, the United States devalued the dollar by 10% and withdrew its convertibility into gold. That the dollar remains the international means of payment became more of a disturbing factor than a point of stability.

2.1.3.2. *The dependence of the MIC¹ on imports of essentials*

The conquest by the Third World of economic power, after decolonization, has been noticeable most with raw materials. The sovereign rights of peoples extends, of course, to their natural resources, particularly when these are non-renewable. OPEC was created in 1960 and CIPEC in 1967, while the agreements on tin have existed for even longer. But, in general, the LDC² were timid about using their power to control the quantities and prices of what was extracted from their soil until OPEC became increasingly militant, between 1972 and 1974. The increasing cost of the other raw materials at about the same time is one of the most tangible signs of a profound re-balancing of the world economy.

As a result, the developed countries have become more dependent on the Third World, notably in the case of Europe and Japan, for their energy supplies. This growing dependence hit all the harder because the fall of the real price of oil during the 1960s, which was orchestrated by the oil companies, had discouraged the West's indigenous sources, such as coal and the ambitious post-Suez nuclear programmes.

The Community must now import 75% of its supplies of energy and other raw materials, compared with 15% for the United States, and 90% for Japan. (Source: Europe 90 - DG III: Raw materials)

2.1.3.3. *Prices have been on a rising trend*

Prices have been on a rising trend since the middle of the 1960s. Inflation once seemed a necessary evil if economic expansion was to be maintained.

Unfortunately, 'stagflation', the simultaneous existence of stagnation, inflation and unemployment, has demonstrated that a slower rate of growth does not alone slow down inflation. International monetary disorders only transmit, and possibly amplify, the inflationary movements of each country.³ So the causes of inflation must be sought *within each country*. One of the motive forces behind inflation has undoubtedly been 'rising expectations', combined with what Interfutures has called the

¹ MIC - market-economy industrialized countries.

² LDC - developing countries.

³ Those countries which are largely open to the outside world (as shown by a high exports/GDP ratio) are also those where inflation is generally lowest.

'oligopolization' of social life. Social groups tend to organize to negotiate with the State and with other groups, which results in conflicts of income-distribution which then stoke inflation. This phenomenon is well summarized by the phrase of P. Masse *Inflation is a temporary agreement to defer disorder*

Finally inflation is the expression of internal contradictions and social conflicts.¹

2.1.3.4. *The réduction in profit and raises of return on capital*

The balance of fear between the United States and the Soviet Union has led to very high defence spending: it is as if every American was employed on defence for three days out of every month. This effective réduction in the capacity of industry to "meet consumer demand is reflected in a fall in productivity, in inflationary tensions, and in an increased propensity to import. At the same time, the LDC are devoting increasing sums to armaments at the expense of their development. In these circumstances, the R&D effort necessary to maintain the post-war technological stock is partly diverted to the military sector and aerospace.

Some analysts suggest that we are undergoing the sort of falling trend in profit levels prophesied by Karl Marx. A GATT study pointed out that if one divides up 1960-74 into periods of five years, the average share of profit in national income in each of the six principal industrialized countries has steadily fallen.² GATT thus argue that most of the current unemployment is structural and would not disappear with growth. It is possible that inflation has been caused by falling trends in profit. Labour productivity is also falling. In the nine countries of the Community the growth in productivity per employed person was 4.3% between 1961 and 1973 and only 2.2% between 1974 and 1978. Part of the explanation may lie in the relative réduction in R&D effort, which, in turn, has slowed down the rate of introduction of the genuinely new technologies.³ The spectacular economies of scale seen immediately after 1945 seem to be reaching their limits. The substitution of capital for labour also seems to be less efficient, partly because of a réduction in opportunities to invest, or because of a maturity in our technology.

¹ See *Nouvelles caractéristiques du développement socio-économique*, report of the Groupe de Réflexion, Commission of the European Communities, Brussels, December 1977, p. 7.

² See GATT, *International trading in 1975-1976*, p. 21. On this point one can also consult the article by C. Sauter: 'L'efficacité et rentabilité de l'économie française de 1954 à 1974', *Économie et Statistiques*, No 68, June 1975, pp. 7-12, and P. Zarifian, 'Inflation et crise monétaire', Éditions sociales, 1975.

³ On this point see Gerhardt Mensch: *Das technologische Pau*, FTV Frankfurt, 1977 and also 5.5, *R&D effort, developments and trends*.

2.1.4. The lessons for Europe

In sum, therefore, several factors developed during the 1960s which presaged crisis:

- The end of American 'exceptionalism' (D. Bell): American économie leadership was too weak to be a regulator, but too strong not to be a disturbing influence for the world economy. Europe, as the leading commercial power in the world, suffered from this phenomenon, but was too weakly organized to fight against it.
- The increasing dependence of the developed countries on the Third World for energy and raw materials, Europe was even more disadvantaged than the United States, which was relatively uninterested in dialogue and concerted action with the LDCs.
- The rapid increase in structural inflation should be attacked at its roots: the *unequal structure of the distribution of wealth* and income, both internationally and within the MIC.
- Lower productivity increases and lower profitability may be due to lower yields on technology, and to the increased économie, social and environmental obstacles to the development of technology. Technological innovation should aim to overcome these obstacles. The microprocessor révolution has major potential in this area which the FAST group should explore.

All of these factors built up into a triple crisis; a monetary crisis in 1971, triggered by a dévaluation of the dollar; an energy crisis in 1973, with the quadrupling of the price of oil; and an économie crisis in 1974-75 with recession, hyperinflation, unemployment and, for the first time in many décades, a cut in the volume of international trade by some 4% in 1975. These crises have shown how ineffective are short term uncoordinated responses. They have damaged European cohésion at a time when this was, and remains, ever more vital.

2.2. The end of a superpower-dominated world and the new actors

The political and économie émergence since the Second World War of Europe and the developing countries combined with the relative économie décline of the United States as compared with Europe and Japan, and the awakening of China, are underlying trends which could hasten the end of a bipolar world dominated by the United States and the USSR. The future looks multipolar and pluralist. Economie development, the prolifération of conventional and nuclear armaments, technological transfers and population growth, are all leading to the émergence of new

powers (China, Brazil, Mexico, India, etc.) which the superpowers can no longer take for granted.

New actors have thus acquired sufficient power to influence international change. These actors obviously include the countries of the Third World, particularly those who are members of OPEC, but they also include the countries of the Far East and the multinational companies. However, before examining the specific rôles played by these new actors we should return to the concept of actor which we introduced above.

2.2. i. The new actors

We need to consider all the actors who play an important rôle in the System and who have some power to enforce their objectives. Naturally the combination of an objective and effective means to achieve it constitutes a strategy of response to change which may or may not be compatible with objectives of the other actors.

Within our conceptual logic (explained more fully in the annex) the term 'actor' does not signify total freedom of action, but only degrees of freedom or margins of manoeuvre bounded by a range of constraints, possibilities and force-relationships which result from past decisions and constraints.

Each problem, and each particular phenomenon has its own specific actors: the multiplicity of actors is rendered more complex by the fact that from one problem to another the actors, like alliances and conflicts, arise and disappear, join together or divide up.

Therefore one needs to look at different groups and alliances of actors depending on the problem studied.¹ For example, in the case of the nation States:

- *within OECD* - North America, Europe and Japan;
- *within the Communist countries*: the USSR and the Communist countries;
- *within the Third World*: OPEC and the non-oil-producing developing countries.

Within the nation States one can distinguish:

- ethnic minorities, political parties, mass media, interest groups, local authorities;
- public and private companies (shareholders or incumbent management);
- trade unions.

¹ See *Interfutures*, Chapter 1H - Fut/77 S. 3. p. 2.

At an international level, there are an increasing number of non-governmental actors, such as the multinational or transnational companies and, perhaps tomorrow, the inter-national trade unions, scientific or cultural associations, etc., and also the international governmental organizations (FAO, UNESCO, etc.)

By the side of the true actors there are a number of institutions which constitute a tribunal, where political, économique or ideologica! dissensions between the major groups are exposed and sometimes settled. They also support a coopération which is being constantly extended.

This profound and desirable movement results in the prolifération of international institutions; there are today, in addition to the thousands of private associations and organizations, more than 200 official international administrations, operating in ail countries, managing crédits measured in billions of dollars, employing nearly 100 000 officials and carrying out public services which hâve become essential in numerous fields.

25% of the finance of the UN comes from the United States, 13% from the USSR, 7.1% from Japan and the Fédéral Republic of Germany, 5.9% from France, 5.5% from China, 5.3% from Great Britain, 3.6% from Italy, 3.2% from Canada, etc. The influence of each State over décisions is quite often linked to the amount of its financial contribution; this means that the UN, for example, often goes in the direction chosen (or tolerated) by the major States.

Some of these actors hâve played a new and important rôle in international changes. We will consider at least three of these: the Third World and OPEC, the transnational companies and the Communist countries.

2.2.2. The rôle of OPEC and the influence of the Third World

OPEC (Organization of Petroleum Exporting Countries) was created in 1960 and reached its présent importance at the end of 1973.¹ It has gradually succeeded in imposing its objectives, which are based on two fundamental principles:

- The fixing of oil priées dérive from the sovereignty of the producer countries, which coordinate their actions within OPEC.
- Petroleum is a resource belonging to the producer countries. It is for them to take ail décisions concerning its exploitation, including production décisions.

¹ At the présent time it consists of Algeria, Ecuador, Gabon, Indoncsia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates and Venezuela.

The result was a sudden catching-up of the fall in real prices which had occurred during the 1960s. The price of oil quadrupled in two years. The major Western oil companies now increasingly play the more minor rôle of service companies: it is often a fundamental rôle, which allows them to retain a strong position. But they can no longer much impose decisions over production or price.

In principle, OPEC's position is perfectly clear:¹ the fall in exports since 1974 due to the world economic recession forced them to support the recovery of the West by limiting their price rises, though this was conditional on a settlement of the Middle East conflict in favour of the Palestinians. This period of grace, aided by a world market glut due to global recession, expired in 1979. OPEC prices are in disarray, but on average they have again doubled in just over twelve months. Quite apart from 'political' production cuts in Iran and Libya, some OPEC countries are re-examining their own development models and adopting a more restrictive supply policy. OPEC's most probable strategy for the next ten to fifteen years is to limit oil supply to a level which will ensure progressive real increases in the price of crude, in terms of a basket of major world currencies (e.g. the SDR) though on a small enough scale to avoid pushing the Western economies into a spiralling slump.

Quite apart from their claims on the oil price, the major success of OPEC was to drive the industrialized countries to the negotiating table: the list of major discussions being held at present is impressive: the creation of the Group of 77, the industrialization of the Third World (the Lima Conference), guarantees in exchange for basic materials (the Lomé Agreements and the Nairobi Conference), monetary conferences (Manila), conferences on food (Rome), and finally the North-South Dialogue.

The Third World is thus riding on the back of OPEC: energy, raw materials, finance and development must be treated on a global scale. If the energy question was settled separately with OPEC, the developing countries would have little chance of pressing their other claims,²

The Third World, though, is not a coherent grouping. The failure of the North-South Dialogue is less due to a rupture between the LDC and the MIC than to a lack of cohesion within the LDC themselves. It is particularly noticeable in the face of attempts by the MIC to divide them: the poorest countries (a quarter of the world) are quite distinct from those countries undergoing rapid industrial development. The solidarity

¹ See in this respect the note presented by Algeria to the Conference of Chiefs of State and Sovereigns of the Member Countries of OPEC, Algiers, March 1975.

² The other producers associations, CIPEC for copper, IBA for bauxite, etc., are not in such a favourable force relationship.

of the Third World seems more fragile than that of OPEC which is in turn threatened by two splits:

- an économique split between those OPEC countries with reserves which are threatened by eventual exhaustion, such as Algeria, Venezuela and Iran, and those which have major financial requirements for developing their économies, and those countries such as Saudi Arabia and the Emirates, which have major reserves and a weak or non-existent industrial sector,
- a political split between the radical Algeria, Libya and Iraq and the conservative Venezuela, Saudi Arabia and Indonesia, to list only a few.

On top of these splits, the weight of the Third World countries and OPEC in international negotiations (which is based on their large number) may be growing, but économique and military 'international' power remains essentially localized in the advanced industrialized countries of the North.

2.2.3. The rôle of the transnational firms

The globalization of mass production processes — most notably in the car industry — has stimulated the interdependence of the OECD économies. The investments of multinational companies (MNC) (most often American) have resulted in an unparalleled extension of the international division of labour. At the same time, capital has been concentrated in a few hands on a global scale.¹ The MNC are growing in importance within the national économies. For example, in the Fédéral Republic of Germany the contribution of the MNC to total corporate turnover has increased from 21.2% in 1969 to 25.1% in 1972. In Australia, the share has risen from 25.8% in 1962-63 to 36.2% in 1972-73.²

There seem to be three phases in direct investment abroad:

- after the Second World War capital was directed largely to Third World countries producing raw materials, energy and basic products. From 1960 to 1967, 60.1% of the profits, interest and dividends received in the United States came from investments in Latin America and the rest of the Third World.³

¹ In the United States, for example, the leading 100 firms held 34.5% of the total shares in-1925, 37.5% in 1947 and 48.4% in 1968. See Michel Aglietta 'Accumulation and régulation of capitalism over a long period. The example of the United States', *Economie et Statistique*. tNSEE 10/74.

² 'The importance of multinational in the member countries'. *OECD Observer* No 86, May 1977.

³ See *The international division of labour* Vol. 1, p. 55, Documentation Française, Paris 1976, (IDC).

- during the 1960s the industrialized countries grew rapidly: Canada, Japan and Europe with the formation of the Common Market (the réduction in customs duties within the EEC created a market of comparable size to that of the American market). Investments in these markets outpaced those in the Third World. Some USD 13 700 million, or 71% of new investment from the United States went to Canada and Western Europe from 1960 to 1967.¹
A new division of production shifted resources away from extraction and primary products in the producer countries to secondary industries in the Western industrialized countries.
- For about ten years the MNC have also become more interested in the industrial sectors of the developing countries, notably the conversion of raw materials and production of cheaper manufactured goods. Their expansion is most clearly seen in countries such as Iran, Brazil and South-East Asia.²

American prédominance in international investment remains, however, incontestable. The United States may control nearly 50% of direct international investments.

New competitors such as Japan are, however, appearing. The major Japanese commercial companies practise a systematic policy of establishment abroad (in particular for those Japanese industries which are losing their competitiveness, see the expansion of Japanese textile industries in Asia but also in Latin America, Africa and in the Western countries.)

To demonstrate the power of the MNC, we need only remark that the turnover of General Motors is greater than the combined GNP of Belgium and Luxembourg, whilst that of Ford exceeds the GNP of Norway. (The concepts of GNP and turnover are différent, but the orders of magnitude are indicative.) American industry has become the third global économie power to such an extent that the relative American décline as measured by GNP is far from évident if one takes into account the production abroad of the 'American' MNC. Similarly, what appears in official statistics as international trade is often, in reality, only internal trading between two foreign companies belonging to the same multinational.

Between 25% and 33% of international trade may in reality be only exchanges between two foreign companies within the same multinational.³ And this transnational trade of course is carried out at priées spécifique to

¹ 'The importance of multinationals in the member countries'. *OECD Observer* No 86, May 1977.

² See on this subject the report 'Transnational corporations and development', UN Centre for Transnational Studies, 1978.

³ See *La division internationale du travail* Vol. X p. 61, Documentation Française, IDC *op. cit.* p. 24.

the multinational; it has nothing to do with the normal competition on world markets but depends on the profit which a multinational wishes to show in one or another country. Profits can be shifted internationally to benefit from particular tax and political advantages, or from expected changes in exchange rates. The free operation of the market is thus often gravely impaired.

The new activities of the MNC affect national economies in several ways: first, through the effect on investments and the repatriation of profits and capital on the balance of payments; secondly, through the effect of their speculation in currencies; thirdly, through their effects on the regional disparities within Europe.¹ Our national economies are thus increasingly affected by decisions which are taken elsewhere. We need as a result to establish a code of conduct to regulate on a basis of reciprocal interest the technological transfers to the developing countries which are carried out by the multinational companies. From their side, the market-industrialized countries should not forget that the new industrial competition from the Third World mainly comes from countries which are only the disguised sub-contractors of Western multinationals which wish to profit from tax breaks or cheap labour.

2.2.4. The rôle of the Communist countries

The indirect confrontation and direct competition of the Soviet Union with the West lie behind many of the important changes in recent decades. The phases in the recent history of East-West relations have been the cold war, peaceful co-existence, the conquest of space, détente, and nuclear non-proliferation, but there have also been wars prosecuted by East bloc client States in Asia, the Middle East and Africa. The economic importance of the USSR and the other countries of Eastern Europe may seem slight, since they account for less than 10% of world trade. But it is sometimes important on the gold, oil, cereals, or capital markets. Irregular and large purchases and sales disturb the international markets. Furthermore, the non-convertibility of the rouble forces the USSR to carry out destabilizing barter trade with the multinational companies.

The rôle of the Communist bloc is also ambiguous in its relations with the Third World. The USSR favours high prices for raw materials which it exports, such as hydrocarbons, but low prices for the tropical products which it imports.

¹ See R. Petrelia 'Una politica regionale europea'. *Nord e Sud*, July 1967, p. 85-95; Datar, *Les firmes multinationales*, No 34, Documentation Française, Paris 1973; O. McDonald, *Multinationals, regional disparities and participation in management*, Council of Europe, Doc. Corn. (75) 36.

Furthermore, the USSR has developed a System of triangular trading. It sells heavy *équipaient* goods to the Third World, and buys raw materials at *priées* lower than the world market *priées*, which it then exchanges with the West.

Another ambiguity in the rôle of the USSR lies in the *compétition* between Communist countries and the developing *countnès* in the capital markets, the import of technology from the West, and the export of manufactured products.

The USSR does not, however, consider itself responsible for underdevelopment, and so it does not participate in the North-South Dialogue. The ambiguities indicated above show that the Communist countries are worried about the *daims* of the LDC. And the latter are not slow to see that being Communist should not excuse a country from development aid.

2.3. Winners and losers under the old order

The apparent size of the changes which *hâve* shaken the world in récent years *hâve* undermined the monetary and commercial System, the geopolitical and military equilibrium, and the social consensus on growth, which were the foundations of the exceptional post-war growth. This seems to mark the end of the 'Old order'. The new — if new it is — has not yet been born.

The controversial balance of cost and benefit in the former world *économie* order suggests that the initiative of the new order should come *îrst* from the developed countries themselves. However, up to the *présent*, we do not seem to *hâve* found a development model which is an alternative to the old order based on consumption, abundance, and the low price of raw materials.

2.3.1. The balance-sheet for the market-Industrialized countries

There may even be an attempt to return to the old order, whilst adapting it to the new socio-economic context and to the importance of new actors at a world level within each industrialized country. There are clear indications of this trend: the outright reaffirmation of free international trade, with an emphasis on the imperatives of competitiveness and of specialization; the search for a new Bretton Woods, at least at the level of the vast continental and intercontinental zones; the attempt by public authorities to weaken the powers of the private sector; the theory that the social policy and macro-economic *régulation* of the 1960s impede the in-

initiative of companies and compound the rigidity of the labour market; the search for the maximum possible geographical mobility of the labour force, the re-examination of the Welfare State, and the increased calls for social discipline and patriotism.

The prolongation of the slump favours this hankering after the old order and makes the industrialized countries suspicious of a 'new' international economic order which might meet the needs of the poor countries. The economic weakness of the Communist bloc and the LDC also favour this trend.

The more one demonstrates the existence of forces making for a 'New order', the more one should also emphasize the forces seeking to restore and readjust the old one. Naturally enough, the developed world wants to maintain or to rediscover political, economic, military and technological supremacy. But the very tension between old and new forces ensures that the future remains open and uncertain.

What is, within this framework, the rôle which Europe can and should play?

2.3.2. A controversial balance-sheet for the developing countries

The expression New International Economic Order (NIEO) was officially born at the sixth extraordinary session of the United Nations on 1 May 1974, where the international community recognized that all States should contribute to the balanced expansion of the world economy. A more just and equitable international order was to succeed the old order, *the advantages of which remain controversial*. According to the World Bank on one hand:

'The past quarter century has seen great progress in developing countries. In virtually all of them, income has risen faster than population, with a consequent rise in income per person. Economic growth has been accompanied by a rapid expansion of education systems, growing literacy, improvements in nutrition and health conditions, increasing technological sophistication, and structural changes, including a growing industrial base and greater urbanization. Progress on such a wide front and the steadily growing capacity of developing countries to manage their economies effectively are impressive achievements'.¹

On the other hand, the developing countries denounce their increasing inequality with the MIC, which is the result of unequal trading. In fact, the

¹ See *Report on development in the world*, World Bank, August 1978, Chapter 1,

true expansion of the Third World has taken place at growth rates which vary considerably from one country to another, and its advantages have sometimes been cancelled out by population growth. Inequalities in *per capita* incomes have increased between the MIC and the LDC, and within the LDC themselves. Indeed, the growth in *per capita* income during the decade 1960-70 was lowest in the poorest countries. The food intake per head has also stagnated in most of the developing countries. Exchange rates have moved disadvantageously to the Third World, and so has their share in international trade up to 1973, and even up to the present time if one takes 1950 as the base year.

Whatever side one takes in this controversy, it is true that the *poorest are relatively becoming increasingly poor and that their absolute number will continue to increase* between now and the year 2000. The rich, however, are becoming increasingly rich and represent a minimal part of the world population. If an income per head of USD 2 500 was the development threshold in 1976, only 12% of the world population (470 million inhabitants) are not underdeveloped.

With USD 300 (1976) per head as the threshold of poverty, 32% of the world population are poor, and 28% will be poor in the year 2000. This represents an increase in absolute terms of 1 280 million inhabitants in 1976 and 1 650 million in the year 2000 (see *Interfutures Summary*, Part 4). The World Bank forecasts the same situation in the same August 1978 report: between now and the year 2000 the absolute number of those suffering from hunger will be maintained at the present figure, namely between 600 and 800 million. The situation will be particularly serious in Africa where the level of self-sufficiency in food products will fall from 80% in 1950 to only 50% in the year 2000.

2.3.3. The claims of the Third World

There is no clear Third World view of what the 'New order' should entail. However, the LDC do share a number of common claims: the right to nationalization, and to permanent sovereignty over natural resources; the establishment of an automatic link between the price of exports from the LDC and the prices of their imports; the establishment of associations of producers of raw materials; the elimination of the chronic trading deficit of the LDC; limits on the competition of synthetic products with natural products, access to Western technology and research at low cost;¹ the control of the activities of the multinationals.

¹ See the request made by the LDC at the United Nations Conference on Science and Technology in the Service of Development (UNCTAD, Vienna, August 1979) to increase the share of world research carried out by [them] from the present 3% to 20% by the year 2000.

Such claims naturally arouse the suspicions of the developed countries, if not their outright hostility. It is rare for privilèges to be unilaterally renounced; only needs and force-relationships control international relations. Using the oil weapon for the first time in 1973 the OPEC countries forced the developed countries to seek a dialogue. Today, however, the illusions have passed. Scepticism has replaced the enthusiasm of 1974.

Such scepticism was compounded by the failure of the North-South Conference which took place in Paris in June 1977, and more recently that of Manila (June 1979). The LDC's claims are far from satisfied. Even the undertakings of the MIC have not been carried out. They are still far from the 0.70% of their GNP which they promised to devote to public development. Perhaps the new increase in oil prices will encourage a further dialogue.

2.4. The international monetary disorder

After the breakdown of the Bretton Woods dollar standard, the major traits characterizing the international monetary disorder were permanent and excessive growth of the international money supply, uncontrolled movements of capital, imbalances in current accounts of the balances of payments, rapid fluctuations in rates of exchange, and generalized inflation. The powerlessness of the central banks in the face of this crisis encouraged the European countries to establish a zone of stability, first with the currency 'snake' and then with the EMS (European Monetary System). Monetary questions are, of course, the subject of endless controversy: we will, however, mention only five points which seem to us to be of value in clarifying our analysis:

- (1) the world version of the monetarist thesis;
- (2) the rôle of international trade in reducing prices;
- (3) balance of payments fluctuations and disequilibria;
- (4) the indebtedness of the Third World and the Eastern bloc countries;
- (5) changes in exchange rates.

2.4.1 The world version of the monetary thesis

Between 1963 and 1973 some of the developed countries attributed world inflation to the deficit in the American balance of payments, which created an excess of international reserves, because the international monetary system was based on the dollar, and banks continued to hold dollars at the agreed parities. This was to some extent a world version of

the monetarist thesis. The growth of international monetary speculation by way of the Euromarkets disturbed national économie and monetary policies and contributed to the growth of domestic inflation. The international global reserves of US dollars and SDRs doubled between 1970 and 1974, whereas the previous doubling had taken twenty years, from 1950 to 1970.

This finding led R. Heiler¹ to conclude that 'there is a direct relationship between variations in the percentage of world money supply and the rate of inflation'.

Nevertheless, a corrélation does not imply that one caused the other, or any direction of causality. Do price rises not cause an increase in the money supply, so that inflation leads to new demands for international liquidity which the central banks attempt to satisfy? On this hypothesis the présent international monetary System, with its floating rates of exchange is not the cause of inflation but it is nevertheless an excellent conductor of it.²

2.4.2. International trade generally plays an anti-inflationary rôle

It is convenient for a country to blâme its domestic inflation on others, explaining that it is importing international inflation by way of its trade. But this is not in fact the case, as is shown in Table I: between 1950 and 1970 world import and export priées increased far less rapidly than domestic priées to the consumer. The opening-up of domestic markets to cheaper foreign products held back domestic inflation.

Table I — Year-on-year changes in world priées expressed as percentages

Year	Priées to the consumer	Priées for export
Mean 1950-59	3.5	1.2
Mean 1960-69	4.4	0.6
1970	6.2	6.4
1972	5.9	4.0
1973	9.6	24.8
1974	15.1	43.3
1975	11.0	7.0
1976	8.0	2.0
1977	11.4	9.0
1978	9.3	9.9

Sources: IMF Monthly Statistical Bulletins.

¹ 'International reserves, money and world inflation', *Finances et développement*, Mardi 1976, VoS. 13 No 1.

² Between 1973 and 1978 the global reserves of the international monetary System doubled. Source: IRB 49th Annual Report.

In 1970 this trend was briefly reversed, so that between 1970 and 1974 external trading prices increased much more rapidly than domestic prices. International prices rose two to three times more than domestic prices in 1973 and 1974.

But in 1975 and 1976 international trade again played an anti-inflationary rôle. This was clearest amongst the Far Eastern countries. Having reached levels of 20% to 25% in 1974 and 1975, inflation rates since 1976 have been practically zero in Hong Kong, very low in Taiwan and even negative in Singapore. Exceptionally, South Korea still has a high rate of inflation, but this is mainly because of its high rate of growth and the consequent overheating of its economy. See Table II.

Table II

	South Korea	Taiwan	Hong Kong	Singapore	Malaysia	Thailand
Annual rate of inflation (1976-78)	15-20%	3-4%	nil	Small! (negative in 1976)	less than 5%	less than 5%
Ratio $\frac{\text{Exports}}{\text{GNP}}$	30%	51%	90%	118%	50%	20%

International trade does not generally encourage inflation because that part of imports which replace domestic products form a brake on price rises. Foreign companies after all can only penetrate the domestic market as a result of the lower prices of their products. In most countries, this reduction in the rate of inflation through international trade has been compatible with the maintenance of growth.

2.4.3, Balance of payments problems: fluctuations and inequalities

At the start of 1974 the rise in the oil price and the worst recession in the post-war period combined to aggravate the world deficits on the current accounts. The table below, in which the world economy is divided into major regions, leads to a number of conclusions.

OPEC current balances of payments are largely in surplus, whereas those of the developed countries, after the major deficit of 1974, went

Table III — *Balances of current payments¹ by régions, 1973-79*

(in 000 million USD)

	Cumulative 1974-78	1973	1974	1975	1976	1977	1978	1979
Industrial régions	20	19	-13	14	-3	-7	20	-1 ^a
of which: Southern Europe	-45	0	-9	-11	-10	-11	-14	
OPEC	18 ^b	6	6 ^c	35	40	32	6	60
Other developing countries	-146	-11	-30	-38	-26	-21	-31	-50
Eastern bloc countries ²	-31	1	-4	-10	-7	3 ^d	-7	-3

¹ Excluding official transfers.² Trading balance (fob-fota).

Source: Annual Report, GATT, IMF. The figures for 1979 and the Eastern bloc countries are estimated by the GATT secretariat.

into credit in 1975 and 1978.¹ For the industrialized countries, the slight global deficit of 1977 covers a number of very different situations. *Some countries were in a position of strength and others in a position of weakness.* The trading balances of the Fédéral Republic of Germany and Japan were largely in surplus during this period, but other Western countries such as France and the United States had major deficits. Naturally, these patterns are repeated in their balances of payments.

These divergencies so encouraged protectionism, that an American Treasury Secretary, Mr Michael Blumenthal, even threatened the Japanese with a 'justified' increase in protectionist pressure.

The imbalances persisted and even increased in 1978 but the GATT experts seem to feel that they are not chronic deficits. There have also been large fluctuations in current balances, aided by changes in exchange rates.³ For example, the United States moved from a surplus of USD 18 500 million in 1975 to a deficit of USD 15 200 million in 1977; Japan, after a slight deficit in 1975, had a surplus of USD 11 000 million in 1977. Over the same period, Great Britain and Italy eliminated their impressive deficits of 1974.

What Table III does not show is that the group of industrialized countries had a large trade deficit with the OPEC countries, 'a deficit which was largely compensated for by the placing of funds from the OPEC countries on industrial financial markets' (see GATT 75-76, p. 73). This is generally termed the recycling of pétrodollars.

¹ It will be noted that there is considerable uncertainty as to estimates of the balances of payments. An error of the order of 30% has been put forward.

² The divergence between the current deficit of the United States (USD 6 000 million) and the current account surpluses of the Fédéral Republic of Germany and Japan (30 700 million) became greater in 1978. Source: IRB 49th Annual Report.

³ GATT 77-78, *op. cit.* Table IU, p. 33.

2.4.4. The indebtedness of the Third World and of the Eastern bloc countries

During the same period the oil-importing LDC were not able to pay for their large trade deficits except with public and private international aid. Despite the rapid fall in the OPEC surplus in 1978, the deficit of the petroleum-importing LDC increased by a third. The industrialized countries moved from equilibrium to a surplus of some billions of dollars. The new rise in the price of energy in 1979 is likely, however, to modify these equilibria.

The indebtedness of the Third World, which often amounts to the same as aid from the developed countries, is now more than USD 250 000 million and it is mainly borrowed by a few countries such as Brazil, Mexico, South Korea and Egypt. Furthermore, this indebtedness is likely to grow worse. Despite these new petroleum receipts, some of the OPEC countries will face financing requirements after 1980 as a result of their development programmes. The non-oil LDC are also turning to finance their development programmes from private banks, and this can only accentuate their indebtedness. Compared to public aid, private bilateral loans have played an increasingly important part in the financing of trade deficits for several years, partly because the recession in the developed economies has made investment in the Third World more attractive. Private companies, of course, are interested in financing the most profitable investments, which tend to be exactly those which create new competition for the developed countries.

Private aid from companies also increases the cost of the debt, the service charges, and the precariousness of the lending banks. It also tends to entail faster repayment terms. Interest payments for servicing the debt principal have increased more rapidly than the total debt, which means that the LDC are increasingly borrowing in order to repay former loans. These repayments now correspond to about 15% of the exports of the debtor countries, as against 11% in 1970 and 8.4% in 1960. So it is hardly surprising that longer repayment schedules and even a moratorium on debt are amongst the principal claims of the LDC on the developed world. Sweden and France have moved some way along this road, whereas others like the United States are strongly opposed to such a moratorium, partly because some American banks have taken risks without guarantees on their loans.

Nearly two-thirds of the loans involved are, in practice, held by six major US banks with the First National City Bank at the head, 15% of US assets being in the form of loans to Third World countries.¹ The concentration of aid loans both amongst a few Third World countries and a few banks on the lending side could threaten a *chain bank crisis*.

¹ See the article by Cheryl Payer, 'The problem of the debt of the Third World and its recent aggravation', *Problèmes économiques* No 1520, 27 April 1977,

As if this was not dangerous enough, the Communist countries also have massive external deficits (see Table III); and Poland and the USSR are also in formidable debt. China could well experience the same problems in the future.

2,4,5. Exchange rate changes

The major fluctuations in balances of payments since 1974 have been accompanied by sudden and massive changes in exchange rates. The crisis in the international monetary System preceded the energy and economic crises which we have experienced since 1973. However, the latter has reinforced the former.

Table IV — *Relative variations in the effective rates of exchange, domestic prices and the competitive capacity of the principal countries, expressed as percentages between 1972 and 1979*

	Effective rates of exchange	Relative changes in prices	Competitive capacity
Denmark	+ 12.8%	+ 1.1%	+ 14.0%
FR of Germany	+ 52.6%	- 29.3%	+ 7.9%
France	- 2.5%	+ 0.2%	- 2.3%
Ireland	- 26.5%	+ 30.0%	- 4.4%
Italy	- 45.3%	+ 81.0%	- 1.0%
Belgium	+ 19.0%	- 20.7%	- 5.7%
Netherlands	+ 26.6%	- 20.8%	+ 0.2%
United Kingdom	- 33.4%	+ 55.3%	+ 3.4%
Europe (9)	+ 1.7%	+ 3.5%	+ 4.5%
USA	- 8.7%	+ 5.0%	- 10.3%
Japan	+ 6.4%	- 16.3%	+ 8.4%

The first column represents the changes in the effective rates of exchange, and the change in domestic prices in each country; both are changes relative to the weighted mean of all the competing countries. The index of competitive capacity, or the real effective exchange rate, is obtained by multiplying the first two factors, and indicates how the prices in a country have changed in relation to the weighted mean of prices of its competitors, adjusted by exchange rate changes.

Source: EEC Annual Economic Balance Sheet 1979-1980 (COM/79-568 final).

It has not been easy for neo-classical economies to explain why the large payment surpluses of the Federal Republic of Germany, Japan and Switzerland continued despite the successive revaluations of their respective currencies against the dollar. In theory, a System of flexible rates of exchange should mean that no country could have a chronic surplus. But in practice, the GATT has argued, equilibrium is only possible when surplus countries increase their imports, because their trade seems

relatively unresponsive to price changes. Alternatively, the countries in déficit need protectionism to restrain imports. The surplus countries hesitate to stimulate their domestic demand for fear of relaunching inflation, and the déficit countries, by protecting their markets, do not improve the competitiveness of their economy. Protectionism cannot, in the long term, do anything but contribute towards maintaining their déficit.¹

The absence of coherent économie policies thus reinforces the crisis. The theoretical virtues of a System of floating rates of exchange no longer hold. Over the long term, rates of exchange do not only follow the differentials in inflation between countries² but also reflect changes in the capacity of each country relative to the others (see Table IV).

The System of flexible rates of exchange also, of course, accommodates inflation, and so helps to maintain it. While the Fédéral Republic of Germany, Switzerland and Japan may not suffer from imported inflation, other countries are not encouraged to improve their situation. It is more tempting to dévalue, which is a disguised form of protectionism.

Faced with the vicious circle institutionalized by floating rates of exchange, the Europeans have attempted to organize, between themselves, a mechanism of coordinated floating against the dollar: the 'European snake' was established at the beginning of 1972. The United Kingdom, Italy and then France were gradually forced to retire from the System which, at the end of 1977, including only the Fédéral Republic of Germany, the Netherlands, Belgium, Denmark and Norway.

Since the beginning of 1978 the establishment within Europe of a zone of relative monetary stability again became désirable, and gave rise to the EMS.

The EMS, in which all the EEC currencies save sterling participate, was established at the beginning of 1979. It is not a true économie and monetary union; it is rather a 'European Bretton Woods', that is to say a replacement of the existing floating rates of exchange by fixed but adjustable rates of exchange. In theory this helps to regulate Community trade (which accounts for 50% of the trade of each country), to encourage investments, and to improve the opération of the CAP (in particular by abolishing the monetary compensatory amounts).

2.4.6. The challenges for Europe

From the preceding analysis, we can restate the following points:

- (1) *The dollar* now plays a more disturbing than regulating rôle in the international monetary system.

¹ See Prospects for International Trading, 1977-1978, GATT.

² For example from 1973 to 1978 the true effective rate of exchange of the Deutschmark (that is to say the variation which still exists when inflation differentials have been taken into account) appreciated by only 2% as compared with the other currencies.

- (2) The présent System *offloating rates of exchange*, whilst not the cause of inflation, is an excellent *conductor* of inflation.
- (3) Free trade increases domestic compétition, and plays an anti-inflationary rôle. Protectionist temptations should be resisted.
- (4) Large surpluses and déficits in balances of payments are not chronic because of floating rates of exchange.
- (5) It is less the amplitude of the indebtedness of the Third World which is disturbing than its concentration amongst a few lenders and borrowers, which threatens a chain bank crisis. The financing by private banks of industrial projects in the Third World are necessarily in the most profitable sectors, which tend to be those in which the developed countries are already established.

Faced with this monetary disorder Europe was clearly right to institute a monetary zone of relative stability; this gave rise to the EMS in 1979. The question remains of knowing whether it will survive, unlike the 'snake'. EMS represents a step away from the vicious circle. If it is successful the ECU (the European Currency Unit, based on a basket of European currencies) could, in tomorrow's multipolar world, play in its turn the rôle of a new currency standard, or at least share one with the dollar. This would restore to Europe its proper position, as it is the leading commercial power in the world, with a third of ail trade.

However, the constraint which the EMS imposes will weigh more heavily on those which are least able to withstand it. *Infaci, without a difficult restructuring, less flexibilité in rates of exchange could lead some countries to chronic déficits.*'

2.5. Trade grows, and changes to focus on Europe

The percentage of world production which is traded doubled between 1960 and 1979, from 7% to 15%. The volume of trade more than quadrupled during the same period. Will this remarkable expansion continue, and with what conséquences?

2.5.1. Growth, free trade and its instruments

From 1913 to 1939 the volume of trade increased by only 0.5% per year, much less rapidly than world production. This was the era of protectionist citadeis, built on colonial empires or zones of influence, and

¹ See 2.6: Down-market countries with ciown-market products are vutnerabtc.

protected by high customs tariffs which ranged on average between 20% and 30%.

In the immediate post-war period the ruined European economies again had recourse to quotas and other restrictions, but 1948 marked the beginning of a lasting expansion. From 1948 to 1974 trade increased by 7.5% per year in volume, sometimes twice as fast as world production. This total break with past trends is explained mainly by the *de facto* adoption of the free-trade thèses developed in particular by the USA. The optimum market, it was held, was the world market. These thèses were put into practice in 1947 by the GATT (General Agreement on Tariffs and Trade) agreements. More than twenty-four countries took part in this agreement which was essentially intended to reduce tariff and non-tariff obstacles to trading.

Parallel to this, agreements developed which were inspired by the same philosophy but which operated regionally, the most striking example of these being the Common Market. Paradoxically, GATT authorizes such groups to make exceptions from the general rule of the 'most-favoured nation', on condition that the arrangements do not hinder trade with other countries. In fact, each stage in the construction of the EEC was immediately followed by a GATT 'round', the objective and result of which seemed to be to reduce further the EEC's external tariff barriers.

The EEC, wishing to prolong the links between certain of the member countries and their former colonies, also created in 1963 a free exchange System in the Yaoundé Convention. This arrangement was supplemented and extended by the Lomé Convention (1975) to forty-six countries in Africa, the Caribbean and the Pacific (ACP) which in particular allowed the free import, exempt from tariffs and without reciprocal concessions for the EEC countries, of a large number of industrial and agricultural products exported by the ACP. The STABEX System guaranteed the ACP against part of the reduction in their receipts from exports during bad years, by paying compensation.

The generalized System of preferences, developed in 1971-72, also extended free trade though it remains limited in its results. The 'Tokyo round', started in 1973, was similarly intended to stimulate the exporting capacities of the LDC, and to broaden the organization of world trade.

The progress in transport Systems and infrastructures supported this growth in international trade.

Finally, the decolonization of the three post-war decades spurred a redeployment of the old multinational firms, and changed the international division of labour, which in turn created new economic links and agents. The IDL¹ encouraged the specialization of economies by sectors,

¹ International division of labour.

instead of simple exchanges of raw materials for final products. Specialization began within économie sectors themselves, so that there was a considérable increase in the trade of intermediate goods and semi-finished products. This is the main explanation for the startling growth of trade between 1960 and 1974.

2.5.2. Trends and key figures

World exports were worth USD 1 600 000 million in 1979, and were divided as follows: Developed countries 64%, OPEC countries 13%, other developing countries 13%, planned-economy countries 9%. Broadly divided, 20% of the products traded were non-fuel raw materials, 20% were fuels and 60% were manufactured products, about half of which were produced by mechanical and electrical industries.

The industrialized countries now import some 75% of the world fuel exports. They also trade half of the world exports of food products, and themselves absorb the greater part. They also export twice as much food to the Communist countries and the LDC as they import from them. By contrast, there are developed country net déficits in minerais and fuels. However, excluding fuels, the industrialized countries remain the principal exporters of raw materials. The USA, for example, is to cereals what Saudi Arabia is to oil.

In manufactured products the MIC account for 80% of the world exports, two-thirds of which is trade between themselves. The industrialized countries direct only a quarter of their exports to the LDC, and this manufactured trade was generally four times larger than the manufactured imports from the LDC to the MIC.

Nevertheless, the LDC, particularly Brazil, Mexico and the newly industrialized countries of the Far East, are supplying more to the industrialized countries, and the market share of the Fédéral Republic of Germany, the United Kingdom and the United States (most markedly) is falling. Between 1963 and 1977 the market shares of Japan and the LDC have doubled, each increasing from 4% to more than 8%.

Though the LDC are suppliers, and consequently *competitors*, they are, above ail, *outlets* for the exports of manufactured products from the MIC. *Any restriction of trading with the LDC therefore risks rather worse retaliation against the industrialized countries.*

The EEC itself accounts for nearly half the exports of the industrialized countries, with trading between the EEC countries representing 51% of their trade as against 33% twenty years ago. This is one effect of the Common Market, which also now constitutes the leading world commercial pôle, ahead of the United States (12% of international trading), OPEC, the Communist countries and Japan.

Trade with the Eastern bloc countries in 1979 accounted for 9% of international trade, 40% of which was raw materials and 60% manufactured products, from the market-industrialized countries. The USSR has developed a System of triangular trading, acting as a link between 'friendly' LDC and the MIC. The trading companies exchange heavy equipment against raw materials with the developing countries, and then exchange these raw materials with the products of the market-industrialized countries. Another peculiarity of trading with the Eastern bloc countries is the 'barter' or buy-back contract with industrialized countries where the supplier of a production unit (such as a car assembly line) is paid with the product. This type of exchange is inadequately reflected in the international statistics, which do not provide statistical breakdowns.

At a world level *two other kinds of trading* are also inadequately (or not at all) shown in the raw trade statistics:

- (1) *Trade between subsidiaries of multinational companies* probably accounts for between a quarter and a third of world trade, according to surveys. Although it is treated as any other sale or purchase from one country to another, it in fact does not follow the same principles.
- (2) *Sales of arms*. According to the estimates of SIPRI¹ these represent USD 20 000 million per year, or slightly less than 2% of world trade, but amount to more than 10% of the imports of manufactured products by LDC.

The politicization of trade contacts is best exemplified in the contracts between the United States and the USSR for cereals and advanced technologies, but is also increasingly important in the relationships between Western countries and the developing countries.

2.5.3. The principal breaks with the past

The recession in the industrialized countries during 1974 and 1975 was reflected in a 4% fall in volume of trading in 1975. The recovery in 1976 and the subsequent decline in EEC economic activity caused an 11% growth in the volume of trade in 1976, but only 4% in 1977 and in 1978, and 7% in 1979. The average growth of trade before 1974 was 7.5%, and after 1974 it fell to 4% on average.

This lower rate of increase of trade was accompanied by changes in the nature of the trade between zones:

First, *the structure of trade* is now less unequal. Before 1974, the developing-country exports were essentially directed towards the market

¹ Stockholm International Peace Research Institute (see *Le Monde*, 24-25 June 1979).

industrialized countries, and their main exports were raw materials. They are now beginning to develop trade between themselves, and to export more manufactured products.

Secondly, the Third World in general is an increasingly large market for the industrialized countries (see 2.5.2.). OPEC is, of course, of primary importance, since its share in the exports of manufactured products from the market industrialized countries *has more than doubled since 1973*. Indeed, the onus has been on the industrialized countries to re-establish their trading balances with OPEC, and they have succeeded very patchily, as can be seen in the following table.

Cover rate for trade with the OPEC zone
(Exports/imports ratio)

	1970	1973	1975	1979
USA	117.3	74.0	49	36
Japan	35.2	39.2	57	37
EEC	43.1	44.6	81	59
FR of Germany	55.2	62.0	127	71
France	50.0	50.2	55	46
Italy	32.4	36.7	70	57
UK	51.6	47.2	122	91

Source: OECD, EKernel Trading Statistics.

Europe, and to a lesser extent Japan, did clearly succeed in improving their trade balance with OPEC. Indeed, the *increase in price* of basic materials reinforced the relationship between clients and suppliers, and this could have *bénéficial effects*, at least in the medium term. The dollars which the Americans 'waste' on oil, after all create employment in Europe when they are spent by OPEC. This is particularly true as *Europe is a more important supplier*, relative to its imports, *for OPEC* than either the United States or Japan.

Apart from changes in the structure of trade, the crisis of 1974 also marked the beginning of a covert and overt attack¹ on the free-trade consensus which had reigned since the Second World War. Protectionism is undoubtedly on the march: it has always covered agricultural products from the temperate zones, which form 10% of world trade. But during the 1960s and early 1970s it gradually gained a hold over trade in textiles and clothing, which form 5% of world trade. Since the crisis of 1974, restrictions on imports have affected the iron and steel industry, shipbuilding, ball-bearings and electronic consumer goods, which then represented another 5% of international trade. New sectors — notably

¹ See J.M. Jcannency, *Pour un nouveau protectionnisme*, Éditions du Seuil, Paris, 1978. See also *Cambridge Economic Policy Review* - April 1980. Vol. 6 No. 1. Gower publishing.

synthetic fibres and footwear — are also being drawn into the protectionist web.

The threat is clearly serious, and it has held the centre of the negotiations during the recently completed Tokyo round of GATT, especially since exceptions to free trade are becoming increasingly numerous.¹ The new protectionist measures demanded by companies and trade unions alike make it possible to reserve in the short term the activity of sectors threatened by low-price imports from the LDC as well as from the other industrialized countries.

These may be justified provided they are temporary, and where they actively help the efforts of the industry concerned to adapt to new markets. But they are dangerous when they arise from the refusal to adapt to the conditions of a constantly changing competition. Protectionism is the weapon of the weak but at the same time it removes their incentive to adapt and to stop their own decline.

Furthermore, the competition from the new countries also creates more prosperous markets in the Third World for other sectors of the economies of the market-industrialized countries. O. Long, the Director-General of GATT, has noted that the existence of a sustained demand in the LDC has stabilized international trade and hence the world economy.

The latest GATT agreements, signed on 12 April 1979, reduced tariffs on average by a third, bringing them down to about 8%. But this is relatively insignificant at a time of fluctuating exchange rates. Their main importance is to control the surge of protectionism and to encourage trade with the LDC without necessarily making reciprocal concessions,

Bertrand Larrera de Morel² has, though, astutely pointed out that 'International trade has rested, since the war, on the twin pillars of the GATT and Bretton Woods monetary System. One of these pillars has collapsed. It might be better to reconstruct Bretton Woods rather than to decorate the other.'

2.5.4. Europe, the focus of international trade

The EEC countries have a mean ratio of exports to gross domestic product of 25%, or 12% if one deducts trade between themselves, com-

¹ We can list, amongst others:

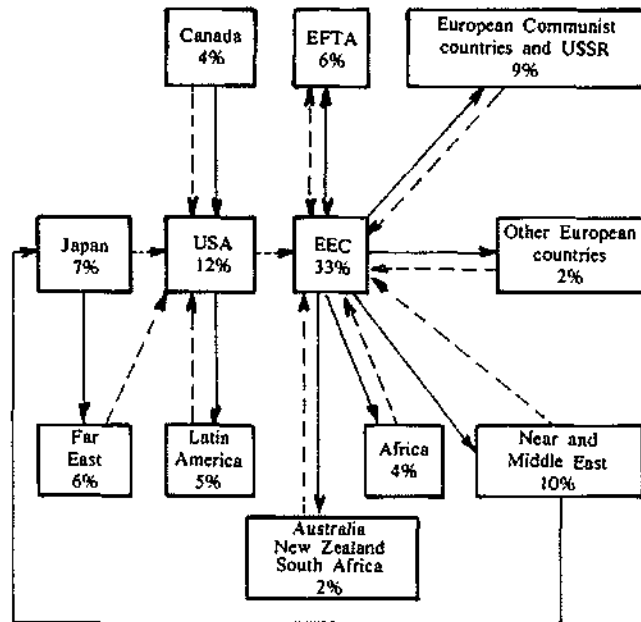
- the Multifibres Agreement: this is an agreement of voluntary restrictions, the EEC countries quantitatively limiting the growth of imports of textiles from the LDC.
- the Trade Act: this makes it possible to lift the entry duties into the USA for products which have benefited from export subsidies (the case of a large part of the exports from the EEC towards the USA).
- the 'American Selling Price' which calculates customs duties on the basis of domestic American prices, and which makes it possible to tax the most competitive products more heavily.

² *The Tokyo Round: An anachronism?*, GATT 1978.

pared to 7% in the case of the USA and 12% for Japan. The European Community clearly constitutes the *crossroads of international trade*. In 1979 it accounted for a third of world exports (though it carries half of this trading with itself).¹ It sells and buys practically three times as much as the USA, five times more than Japan and nine times more than the USSR. The EEC is thus a supplier for the great majority of régions (though not necessarily the major client).

Trading by régions

(in 1978: principal client - principal supplier relationships)



A—"B indicates that A is the principal supplier of B (e.g. Japan is the principal supplier of the Far East).

C---D indicates that C has D as its principal client (e.g. the USA have the EEC as their principal outlet).

This diagram does not include the Communist countries of Asia (China, North Korea, etc.) as they account for less than 1% of international trade. The figures given for each group of countries show the percentage of that région in world exports in 1978.

¹ Intra-Community trading accounts for a greater proportion for the smaller countries than for the others: Ireland, Belgium and Luxembourg export 75% towards the other member countries and the Netherlands 70%, as against 45% for the Fédéral Republic of Germany and 35% for the United Kingdom.

The diagram shows the bipolarization of international trade around the EEC and the USA and the central rôle played by the EEC in trading, since it is often both the principal client and also the principal supplier to other régions. The EEC has in its area of influence EFTA, the other European countries, South Africa, Australia, New Zealand, Africa, the Middle East, the Communist countries of Europe and the USSR. In ail these régions it is both the leading client and also the leading supplier.

On the same basis the United States has, within its sphère of influence, Canada and Latin America and, to a lesser extent, Japan and the Far East where they are the principal client whilst being a major supplier.

The *Community* has the lion's share of manufactured products, with 44% of world exports. It also has a leading position for *chemical products, with 55% of world exports*. This is quite obviously its warhorse, since manufactures represent four-fifths of EEC exports and more than half of EEC imports.

The régional structure of extra-Community trade shows first the importance of the LDC as commercial partners, and the slackening influence of the USA. The most noticeable development is the deployment of EEC exports towards the OPEC zone since 1973, with a simultaneous levelling-off of their share in EEC imports. We have already mentioned the change in EEC-OPEC export-import ratios.

The world-wide nature of the EEC's trade is also reflected in its trade agreements. In Europe, in addition to the treaties concluded with the three candidate countries, there are free-trade agreements with EFTA. Turkey is associated with the Community, as are Cyprus and Malta. Coopération or association agreements have been established with the Mediterranean countries, and are being negotiated with the twenty-one countries of the Arab League.

In the Communist world agreements have been concluded with China and Yugoslavia, and are under fitful discussion with Comecon. The Third World is associated with Community trade through the GSP and the Lomé Convention. There are spécial régional agreements with ASEAN and the Latin-American countries. Finally, there are the Community institutions which represent the Nine in the GATT.

The dependence of Europe on the rest of the world for its energy supplies (55%) and for non-energy raw materials (75%) should not be allowed to obscure another reality. *Europe, as the meeting-point of international trade, plays a vital rôle in the economy of the other régions of the world. The converse is not always true.*

2.5.5. The challenges for Europe, and the technological prospects

To repeat some points from the preceding analysis:

- *Protectionism will cause more problems than it solves.* The interdependence which has resulted from the spectacular increase in international trade will amplify the negative effects of protectionist pressures.
- Despite the growing industrial competition from the Third World, which seems inevitable, the developed countries run ever larger surpluses in manufactured products with the developing countries.
- The new trend towards the growth of trade between the LDC could help overcome the harmful effects of a recession affecting the developed countries because the LDC may develop a different economic cycle to the industrialized countries (which in fact seems the case since 1973) and thus help to stabilize the world economy.
- Europe, as the centre-point of trading, is an essential market for most of the other regions of the world. Its good health is vital for the world economy.

Under these conditions, Europe clearly should *assume its rightful place* as the leading commercial power in the world, and play a dominant role in the organization of international trade.

Secondly, it should also avoid protectionist temptations, since it is likely to be the first to suffer. Thirdly, governments might encourage trade links with areas not traditionally within the EEC's 'sphere of influence', such as Latin America and the Far East, though the commitment to multi-lateral trading should remain a central part of the EEC's policy.

Finally, we should note that international trade has been encouraged by progress such as containerization and cold-storage in land, sea and air transport. But increasing costs should lead to a re-examination of other methods such as dirigibles, hovercraft, and mixed systems of sail and power in certain cases. Further trade in gas and chemical products, and perishable foodstuffs will also require new specialized transport technologies.

2.6. Down-market countries with down-market products are vulnerable

Interdependence explains the rapid spread of the 1974 crisis. Crisis in turn reinforces interdependence, since it is necessary to export manufactured products to pay for necessary imports such as oil and raw materials. *Specialization* therefore seems to be *inevitable*. This is implicit in most of our economic policies. It does however pose several fun-

damental questions. What is the relationship between growth and specialization? What are the conséquences for industrial relations between the North, South and East; and are there real advantages of specialization, or are there alternatives?

2.6.1. Growth, free trade and specialization

Until 1974 world trade expanded more rapidly than world production. Interpénétration increased for all catégories of products, but particularly for manufactures. The crisis in 1975 suddenly halted this process. World production increased more rapidly than international trade, so that between 1976 and 1977 the degree of interpénétration remained globally the same. Interpénétration increased only marginally in 1978 and 1979. But this apparent stability hides two divergent developments: first, agricultural and manufacturing specialization has intensified, and secondly, mineral production has become more national, and less internationally specialized.

There seems to have been, until the crisis, a high degree of corrélation between the degree of specialization of countries and the rate of growth. Should one conclude from this that intensive specialization is a condition of growth?

If it is, the future does not augur well for expansion. The crisis marked the beginning of serious doubts about free-trade doctrines, and a rebirth of arguments for new forms of protectionism.¹ The brake on free trade is to be found in the inadequate growth of the developed countries, which has not allowed them to transfer labour from the declining sectors to the developing ones. France, Italy and the United Kingdom are less well placed than the USA, the Fédéral Republic of Germany or Japan to carry out the adjustments imposed by the industrial threat of the Third World.

The new factor in récent years has been the rapid industrialization of some LDC, which means that for the MIC there was new compétition in manufactured products, particularly on the most profitable markets — those of the developed countries themselves. What is the nature of the new industrial challenges with which the developed countries are confronted? Why do certain countries gain or lose in the exports race?

2.6.2. The industrial threat of the Third World

The Third World countries account for 70% of the world population and about 8% of world industrial production. This latter percentage has been

¹ See J.M. Jeanneney, *Pour un nouveau protectionnisme.*, Le Seuil, 1978, or the *Cambridge Economic Policy Reviews*.

static for the last twenty-five years. The objective, fixed at the 1975 Lima Conference,¹ seems today unrealistic, but at least reminds us that the industrialization of the Third World is an irresistible phenomenon. One may reasonably expect that the share of the LDC in world industrial production will double between now and the year 2000.

Since the Second World War, the extension of the international division of labour — according to the Ricardian theory of comparative advantage — has contributed to the unprecedented growth of the Western countries, even if development has not often been equal, or shared by the Third World. Today, however, the comparative advantage in textiles, clothing, petrochemicals, mechanical and electrical engineering lies with the LDC. *The industrialization of the Third World is therefore irreversible.* The MIC have no hand in its growth except by the quick transfer of technology and capital. The competition of companies in the developed countries to obtain markets for equipment leads them to transfer their most recent know-how and techniques. Fewer turn-key factories are being delivered, but increasing numbers of total-production factories. Despite their indebtedness, the LDC obtain the necessary loans from private banks. The loans of the American banks to the non-petroleum exporting LDC have become considerable since 1973. To some extent their financial survival will involve the success of their gamble on the industrialization of the Third World. It is thus even more urgent for the industrialized countries to adapt, as *the LDC have already begun their adjustment to face the new North-South competitive threat.*

The rapid industrial development of some of the Third World countries poses several problems, not only of rising costs and the lack of training and skilled workers, but also of urban growth, the exhaustion of natural resources, and industrial change. In South-East Asia, for example, the relatively advanced countries like South Korea, Hong Kong, and Singapore, are now afraid of competition from Taiwan, the Philippines, Malaysia, Indonesia and India, which are all countries with low wage rates. They are also afraid of the protectionism of the developed countries. South Korea has therefore decided to abandon the least profitable sectors, such as textiles, which now account for 40% of its exports, and to seek new partners in order to invest in the LDC.

In Singapore, the present trend is to turn towards the non-polluting industries and products of high technical content, since textiles and mass electronic goods in the lower end of the range have been affected by protectionist measures.

In the future, Communist China could also become a large exporter of manufactured goods. This is the only long-term means it has to finance

¹ That the share of the LDC 'should be increased to the maximum and brought, if possible, to at least 25% of the total world industrial production between now and the year 2000'.

its industrial development, since its exports of raw materials are limited by the growth of its domestic needs. This prospect should not be taken lightly. There are already 4 million Chinese in Hong Kong and 2 million in Singapore. Chinese business acumen is renowned.

At the present, though, most of the exports of manufactured goods from the Third World come from only a handful of countries and involve a limited range of products. Half the exports of manufactured goods from the Third World come from four countries in South and East Asia: Hong Kong, Taiwan, South Korea and Singapore. If one adds Brazil and Mexico, the proportion rises to 75%. Moreover, the imports of manufactured goods from the Third World are essentially textiles and mechanical and electrical-engineering goods. In 1976 84% of the shirts and 49% of the trousers bought in the Federal Republic of Germany came from the Third World; the figures in France were 43% and 32% respectively. And, according to GATT, 1977 was the first year when the products of the electromechanical industry replaced textiles and clothing in the first rank of manufactured goods exported by the LDC.

Taken overall, the Third World countries account for less than 10% of world exports of manufactured products. Though it is true that their share in world textile exports is 24% (of which two-thirds are intended for the developed countries) it is also true that the balance of trade for France, with 'savage competitors' such as Hong Kong and Singapore is consistently positive.¹

One should clearly not underplay the developed countries' problems of 'industrial adjustment', but equally there is no cause to dramatize the situation. Only 8% of all OECD imports of manufactured goods come from the Third World. Within this total, the ratio is 16% for the United States, 23% for Japan, 8% for the Federal Republic of Germany and less than 6% for France. Moreover this ratio increased rapidly up to 1973 but has stabilized since then. This may be the first result of restrictions on imports of textiles and clothing.

The Federal Republic of Germany and Japan are amongst those countries which admit the largest quantity of imports from the Third World. Both have come out winners from the crisis. Though this success certainly results from national cohesion and exemplary organization, it is also explained by a high level of industrial specialization.

2.6.3, The measurement of specialization

Specialization implies that a country concentrates its efforts on certain sectors which are judged to be favourable and leaves other sectors which

¹ See Y. Berthelot, G. Tardy, *Le défi économique du Tiers-Monde*, Documentation Française, 1978.

are judged to be less favourable. Why do some countries draw advantages from specialization, while others turn towards those products which the former have abandoned because they were less profitable or without a future?

Successful specialization is vital, since it is industrial exports which allow the MIC to pay for their necessary imports of energy raw materials and tropical products. Some countries are more vulnerable than others since they are relatively specialized in *sectors with comparatively unskilled labour*. Consequently, they are the most *threatened* by competition from the LDC and the countries of the Eastern bloc.

Conversely, those countries which specialize in 'sophisticated' products with a high intensity of skilled labour,¹ together with those central activities which make for a dynamic modern economy (computers, machine-tools, R&D, telecommunications) are in a better position to control, rather than to be subject to the international division of labour.

In other terms, the situation of a country will be more favourable when it exports fewer 'threatened' products and more 'sophisticated' products, and when it imports many 'threatened' products and few 'sophisticated' products. In this way, *trade patterns are a first measurement of specialization*.

This criterion has been used by the departments of the Commission in recent studies.² It ultimately measures the degree of competition which exists on *world markets*.

A second criterion of specialization is that of world demand, which is the sum of the domestic consumptions, and is thus not the same as international demand represented by trade. Even if, at a given time, a country extracts advantage from international trade, it may be that its medium and long-term development will be unfavourable if the country does not adapt itself to changes in world demand.

Industrial production is a dynamic process, with products behaving like living beings which live, grow and finally decline and disappear according to R. Vernon's 'theory of product cycles'. It is possible to demonstrate this phenomenon by classifying products by their changing share in world demand and trade. 'Progressive' products grow faster than world demand and trade, while 'regressive' products grow more slowly or even decline.

¹ The criterion of intensity of human capital' as defined by B. Balassa measures the proportion of skilled work in production, but it indirectly measures the degree of technicality of the production process. Activities with the lowest demand for human capital represent two-thirds of the exports of the most dynamic LDC.

² See *L'évolution des structures sectorielles des économies européennes depuis la crise 1973-1978*. DG II/140/2/79-FR.

World demand is therefore an important criterion of international specialization. *If a country increases its exports on a régressive market abandoned by its principal competitors it may obtain some advantages in the short term. But in the médium and long term such a policy would be very dangerous. The overall size of its market can only increase slowly, so the country can only lose ground compared with its partners at the same level of development.¹

The use of these two measurements leads us to make some conclusions which demonstrate profound différences in the specialization of the most advanced industrial countries.

2.6.4. The criterion of trade and the measurement of vulnerability to the LDC

It is not possible to set out in détail here the *methodology* used to measure specialization in the studies cited above. We should nevertheless restate some of the limits on the analysis of trade which are mentioned by the authors themselves. First, there is a bias as a result of the very différent degrees to which the countries are open to world trade. Secondly, trade between the subsidiaries of multinationals may also confuse results. Despite these problems, however, the results of the analysis were sufficiently significant to attempt an initial diagnosis.²

This analysis was carried out on the basis of the OECD's foreign trade statistics, grouped together to produce about 160 catégories of products of which 140 were manufactured products. These catégories were themselves then grouped into relatively homogeneous types of activity. The criterion which appeared to be the most discriminating was skilled work rather than the intensity of physical capital (measured by the capital/labour ratio). But a combination of both criteria made it possible to rank the products in their order of vulnerability to competition from the LDC. On the one side, therefore, are the *threatened products* (which use unskilled labour and little capital) and on the other the *sophisticated products* which are less threatened.

The first way of approaching this phenomenon is to look at the percentage share of products using relatively unskilled labour in the total imports and exports of manufactures of each country or région. Between 1963 and 1976 this percentage remained stable for the EEC at the relatively high level of 18% of exports, and 21% to 22% of imports. By contrast, in Japan low-skill products fell from about 30% to about 12%

¹ See *La spécialisation internationale des industries à l'horizon 1985*, CEPII study. Documentation Française, Paris, 1978.

² See *L'évolution des structures industrielles des économies européennes depuis la crise 1973-1978*, DG II/140/2/79-FR - April 1979.

of manufactured exports, but increased from 8% to 28% of manufactured imports. In the United States, the proportion fell over the same period from 12% to 8% (7% in 1970) of exports and from 29% to 21% of imports. The lower growth of wage costs in the EEC relative to the United States since 1970, and the increasing competitiveness of some American products, explains why the Community has been slow to change.¹ *The EEC is therefore much more vulnerable in threatened production sectors than the United States or Japan.*

A second way of measuring the 'degree of engagement' of a country in one type of activity is by analysing four principal indices, all of which give us some idea of whether a nation is moving into or out of markets for threatened products and sophisticated products.

The first vertical column in the following table shows us the change in the index of a country's exports of threatened products relative to its total manufactured exports. A rise in this index (denoted on the table by an arrow pointing upwards) therefore shows that a country is exporting proportionately more unskilled labour/low capital intensive products, which is clearly an undesirable development.

The second vertical column shows the change in the index of a country's exports of sophisticated products relative to the change in all its exports. A rise in this index (an upwards-pointing arrow) is therefore a healthy development.

The third column shows the change in the index of imports of threatened products relative to all manufactured imports, and a rise (an upwards-pointing arrow) is therefore in the long term a good sign.

The fourth column shows the change in the index of imports of sophisticated products relative to total manufactured imports, and a rise therefore signifies weakness.

The table thus condenses the intermediate results from the Commission study we cited above, over the period from 1963 to 1976. Five levels of specialization (in either threatened products or sophisticated products) relative to total exports and five levels of import pénétration (in either product category) can be distinguished:

Very Low (VL) : relative index less than 0.6
Low (L) : relative index between 0.6 and 0.9
Average (A) : relative index between 0.9 and 1.1
High (H) : relative index between 1.1 and 1.4
Very High (VH) : relative index above 1.4

¹ Sec Doc. No 7 EUROPE 90, *Rapport sur les relations économiques et financières internationales.*

Export specialization and import pénétration: trade changes in the principal industrialized countries — 1963-1976

	Export specialization				Import penetration			
	Level and change in the index of exports of threatened products relative to all manufactured exports		Level and change in the index of exports of sophisticated products relative to all manufactured exports		Level and change in the index of imports of threatened products relative to all manufactured imports		Level and change in the index of imports of sophisticated products relative to all manufactured imports	
	1963	1976	1963	1976	1963	1976	1963	1976
USA	VL → VL		H → H		VH → A		L → L	
Japan	VH → VL		L → L		VL → H		VH → VH	
FR of Germany	L → L		H → H		VH → H		A → A	
France	VH → A		A → A		L → A		H → A	
Italy	VH → VH		L → L		VL → L		H → VH	
UK	L → A		A → H		H → A		H → A	
Netherlands	H → A		H → VH		H → H		L → A	
BLEU	VH → H		VL → A		A → H		A → A	

Example of the use of this table: From the first column, we can see that Britain in 1963 exported below average (L) threatened products, but that their share in all Britain's manufactured exports was average by 1976. Britain's exports of sophisticated products, however, are improving, while in the third column Britain's imports of threatened products were falling showing weakness. And in the fourth column, the index of imports of sophisticated products is falling, which is felt to be a healthy development.

Key: VH = very high, H = high, A = average, L = low, VL = very low.

Source: FAST.

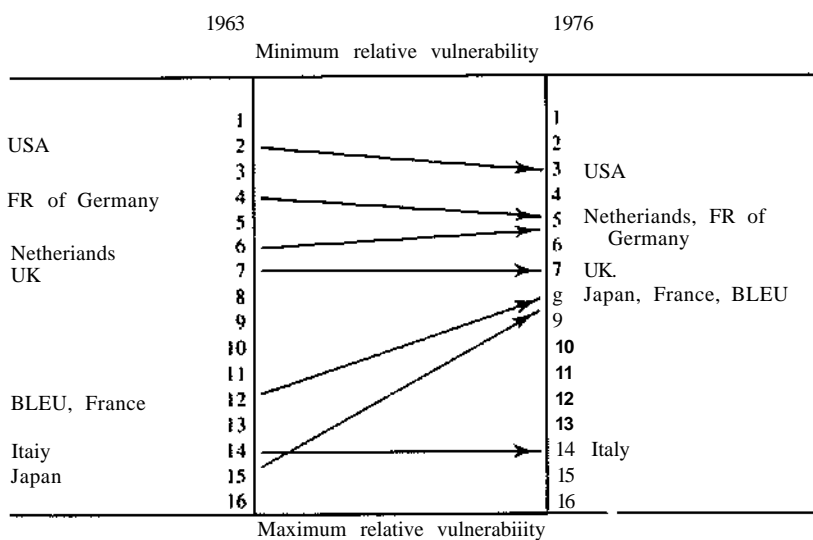
The most favourable situation from the point of view of international specialization is clearly that of a country disengaged from threatened products and engaged in sophisticated products. In 1976, no country is in this situation, but some are not very far from it. The position in 1963 and 1976 of the principal industrialized countries on the *scale of vulnerability*,¹ facing industrialized competition from the Third World, shows the *privileged situation* occupied in 1976 by the *United States*, fol-

¹ It is possible to construct an approximate scale to evaluate the distance which separates countries from an optimal situation. Clearly, not all countries can reach this situation at the same time, since we are examining relative specialization. This distance is calculated on the basis of the sum of the absolute values of the divergencies between the qualitative scores of a country as compared with the ideal situation. Example: There is a divergence of 1 between high and very high and 2 between average and very high, etc., therefore the scale runs from 0 to 16.

lowed closely by the Netherlands and the Federal Republic of Germany. Italy, the last in the classification over the whole of the period, seems to be the country most vulnerable to competition from the Third World. The situation of Italy appears to be disturbing, insofar as the close links between its exchange-rate parity with the other EEC countries within the EMS makes it more difficult to maintain its price competitiveness, whilst at the same time the effort to restructure its industries towards activities of a high added-value makes investment doubly necessary.

The most favourable change from the point of view of vulnerability is that of the country which both reduces its engagement in threatened products (réduction of export-specialization index and increase of the import-penetration index) and simultaneously intensifies its engagement in sophisticated products (increase of the export-specialization index and réduction of import-penetration index). Only two countries, France and Japan, have experienced this development.

Vulnerability of the principal industrialized countries to competition from the developing countries



Source: FAST

Nevertheless, though the reduction in Japan's vulnerability is spectacular (it exports less and less of the threatened products and has become very open to this type of import) it is still very much an importing country and only to a limited extent an exporter of sophisticated products such as

¹ Sec DG 11/140/79-FR. April 1979, *op. cit.* p. 50.

equipment goods. So that, despite a more favourable trend, *in 1976 the vulnerability of Japan was average and in fact comparable to that of France and Belgium*. This does not indicate an inadequacy of Japan's technical capacity, but rather reflects a strategy of specialization in *the profitable sectors which are not necessarily the least vulnerable*.

The position of three other countries is surprising. *Britain*, despite its relative economic decline, has *not become more vulnerable* and has even become a strong exporter of sophisticated products. *The Netherlands has caught up with the Federal Republic of Germany*. Though it has simultaneously intensified its relative imports and exports of the sophisticated products, this is due to the import of products for subsequent re-export. *The Federal Republic of Germany* seems to have become marginally more vulnerable, but the change is not marked enough to be significant.

In order to clarify these apparent anomalies, it is necessary to look beyond the concept of vulnerability and consider *profitability in the most important markets*, that is to say *changes in demand*. The products using the most skilled labour and the most sophisticated plant may not necessarily be the ones whose demand is growing fastest.

2.6.5. Demand and profitability

World demand (the sum of national consumptions) must not be confused with *international demand*, which is expressed through trade. The single criterion of trading to measure specialization can lead to erroneous conclusions.

The search for 'target areas' is a dynamic method of management which is currently practised by companies. It involves identifying the phase during which a given product is growing strongly, so as to produce it before the market is glutted by other producers. Products behave like living beings. They are born, grow, decline and then disappear. Put simply, each country chooses, or suffers, a certain degree of specialization which makes it a net exporter in some sectors and a net importer in others. The growth in demand for different products is unequal. A country whose productive apparatus is directed towards satisfying fast-growing world demand will be better placed than another which seeks to export those goods which are less required.¹

We can demonstrate this phenomenon by classifying products on the basis of their more or less rapid rate of growth. CEPII has regrouped 54 categories into six classes of equal numerical importance:

— strongly progressive (where the growth of demand is 9.5% per year or

¹ CEPII study - *op. cit.* p. 50.

- more), the most dynamic being category FO (office and data processing machinery) where the rate is 13.4%;
- averagely progressive (between 7.9% and 9.4%);
 - weakly progressive (between 6.8% and 7.8%);
 - weakly regressive (between 4.8% and 6.7%);
 - averagely regressive (between 4.0% and 4.7%);
- ~ strongly regressive (less than 4.0%), the least dynamic being category DD (leather and skins, furs) which show a decrease of -0.3%.

Table V — *Rétrospective scale of free-location industries*
Growth in volume of the world domestic demand

a	b	c	d	e	a	b	c	d	e
<i>Highly progressive catégories</i>					<i>Slightly regressive catégories</i>				
1	(6)	FO*	Office machinery, data processing	13.4	28	(30)	GA*	Basic inorganic chemistry	6.7
2	(5)	GH	Plastics products	12.5	29	(17)	FB	General mechanics	6.6
3	(8)	FL	Electronic components	12.3	30	(33)	FO*	Large-scale electrical installations	6.4
4	(M)	FK*	Optical instruments and cameras	11.6	31	(7)	FS	Car manufacturing	6.1
5	(24)	GC*	Basic organic chemistry	11.4	32	(35)	CA	Iran and steel	5.9
6	(12)	GG*	Plastics, synthetic fibres and artificial fibres	11.4	33	(46)	CB	Non-ferrous metals	5.6
7	(31)	FF	Warehouse equipment and equipment for building and public works	10.2	34	(14)	EE	Various manufactured goods not elsewhere classified	5.6
8	(32)	FJ	Watch and clock-making	9.6	33	(41)	EC	Paper and paperboard	5.5
9	(13)	DC	Knitted goods	9.5	36	(23)	KH	Drinks	4.8
<i>Catégories showing average progress:</i>					<i>Catégories showing average regression</i>				
10	(39)	FG	Machinery for specialized industries	9.3	31	(42)	KE	Fruit and vegetable preserving	4.4
11	(26)	FR	Electrical equipment and fittings	9.1	38	(20)	EA	Wood processing and sawing	4.3
12	(22)	GF	Pharmaceuticals	9.0	39	(27)	ED	Printing and publishing	4.3
13	(15)	FC	Engines, turbines and pumps	8.5	40	(2)	FT	Motorcycles and pedal cycles	4.2
14	(3)	FM	Consumer electronics	8.4	41	(29)	CC	Heavy foundry work	4.1
15	(40)	FE	Machine tools	8.3	42	(36)	FW*	Aeronautical construction engineering	4.1
16	(19)	FP	Domestic electrical appliances	8.2	43	(4)	EB	Furniture	4.0
17	(16)	FA	Heavy boiler work	8.2	44	(43)	FU	Railway equipment	4.0
18	(28)	GD	Paints and dyes	7.9	45	(34)	KI	Manufactured tobacco	4.0
<i>Slightly progressive catégories</i>					<i>Highly regressive catégories</i>				
19	(37)	BC	Glass and glassmaking	7.7	46	(48)	GE	Toiletries and toiletries	3.9
20	(38)	FM*	Telecommunications equipment	7.6	47	(53)	KF	Sugar and sugar confectionery	3.6
21	(45)	KG	Spices and other foodstuffs not elsewhere classified	7.3	48	(44)	DA	Spinning and weaving	3.5
22	(54)	FD	Agricultural equipment	7.2	49	(51)	KD	Meat and fish preserving	3.5
23	(25)	GI	Pneumatics and rubber products	7.2	50	(9)	DE	Footwear	3.5
24	(47)	IC*	Refined petroleum and fuels	7.0	51	(1)	DB	Clothing and made-up goods	2.6
25	(52)	GB	Fertilizers and agricultural products	7.0	52	(49)	KA	Cereal-based products	2.2
26	(10)	JV*	Shipbuilding	6.9	53	(50)	KB	Animal and vegetable fats	1.6
27	(21)	F!	Measuring and precision instruments	6.8	54	(18)	DD	Leather goods, pelt dressing and furs	-0.3

a: Listing number.

b: Classification by world trading.

c: Code reference of the category.

d: Content of the category.

e: Rate of growth in volume.

*: Products with a high content of advanced technology and capital.

The misleading nature of a classification based solely on world trade is highlighted by this table. Looking at international trade only, (vertical column b) the most dynamic category would be DB (clothing and tailoring), which comes fifty-first in growth of domestic demand (column a). The least dynamic in trade would be FD (agricultural equipment), classified in twenty-second position in total demand. The 'clothing' category appears dynamic at international trade level because production has been abandoned by a large number of LDC and the market is increasingly satisfied by imports; conversely 'agricultural equipment' appears to be less dynamic, since many LDC are building factories to satisfy their domestic demand and to replace imports by national production.

An analysis of the growth and profitability of demand must therefore necessarily supplément an analysis of vulnerability of the supply. The fastest growing products are often those where production is more complex, requiring a lot of investment and highly-skilled labour. However, the corrélation is far from being perfect. In Table V, the ten catégories of products which require advanced technology and high-capital intensity are indicated with an asterisk. Only four of these catégories figure in the group of fastest-growing products, whereas three appear in the fourth and fifth groups. The skills and quality of labour and capital are therefore only one constraint within which countries may choose their strategy of specialization (See CEPII study).

The analysis carried out by CEPII shows that the United States, the Fédéral Republic of Germany and Japan have specialized in the fastest-growing products and have abandoned slow-growing ones. The United Kingdom and Italy are restricted to the slower-growing products, and France has an intermediate position. This is despite the fact that none of these latter countries has seen their products become more vulnerable to Third World competition, on the criteria of inputs of skilled labour and advanced technology,

2.6.6. The challenges for Europe and the technological prospects

Specialization poses a major theoretical problem. Even if each country gains from trade according to the theory of comparative advantage, not all countries can specialize in the same fast-growing target areas. *Specialization can thus only be unequal.* There will be countries which, relatively speaking, gain and others which lose.

Overall, the EEC countries appear, on an analysis of external trade, to be *more vulnerable* to competition from the LDC than the United States. Furthermore they are also, unlike the United States and Japan, *specialized in products for which world demand is growing relatively slowly.* This average obscures the considerable and increasing disparities between the Fédéral Republic of Germany and the Netherlands on the one hand and Italy and the United Kingdom on the other.

This increasing divergence between the European countries is all the more worrying since the burden of change is greater *'on those who appear to be least able to influence the long-term development of the international distribution of labour'*. The weakest must exert the greatest effort to adapt, while they are less well placed to do this.

In turning towards those industries *which are technically most advanced* and capital intensive, the market-industrialized countries risk *aggravating structural unemployment*. It is not possible to count on the present tertiary sector to create employment, as the microelectronics revolution in telematics is likely to lead to manpower cuts in banks and insurance companies.

However, the industrial threat of the Third World has at least the merit of driving the market-industrialized countries towards an industrial restructuring which is the more urgent because the prosperity of the 1960s led them to ignore it. Competition from the Third World creates problems for some industries but it also opens up prospects to others. The more the developing countries export the more they can import. Most studies confirm that *'the global impact of competition from the LDC on employment in the industrial countries is neutral if not positive'*.

The redeployment of the industrialized countries is the more urgent because the most advanced LDC are already starting to move up-market as their products are threatened by still poorer countries. After the textile, iron and steel industries, the more advanced developing countries will move into the automobile, aluminium and petrochemicals industry, which could be the new threatened sectors. Will the industrialized countries be able to adjust to this new state of affairs?

The reply is probably yes for the Fédéral Republic of Germany, Japan, and even France and the United States. But it remains uncertain for most of the other countries. Within the LDC it is already customary to distinguish a *'fourth world'* of the least advanced countries. If redeployment in the developed countries cannot be organized in time will it soon be necessary to introduce a similar distinction within the European countries?

Clearly, if *Europe* is not to be both outstripped by the United States and Japan and caught up by the countries of the South and the East, it must specialize in the most sophisticated techniques, not only in the advanced sectors like aeronautics and télécommunications but also in the threatened sectors such as textiles, iron and steel and cars. Automation and the introduction of microprocessors might again encourage the relocation of activities such as textiles in the developed countries.'

¹ In Fact, as has been pointed out by John Nevin, Président of Zenith Radio (United States): *'As soon as production is automated the question of knowing whether one is paying 25 cents or USD 3 an hour for labour is no longer of any importance'* (Sec *Economia* No 38, November 1977, p. 37).

2.7. The energy disarray: Import dependence and price hikes

So much has already been written about the energy crisis that we confine ourselves to the major points.

The energy disarray today is due to a large extent to the many forecasting errors, with massive conséquences, which were committed in the 1960s. We should at least try to draw up a balance-sheet to examine the challenges that are likely to face us in the future.

2.7.1. Forecasting and its errors¹

Few économies or energy ministers forecast the quadrupling of the price of oil which took place in 1973-74.² The models for longterm forecasting were based on a continuation of the falling price of oil in constant money terms, and thus the maintenance of growth. They also assumed a constant relationship between growth and energy consumption. It is thus easy to criticize the flawed analysis of the energy situation, and the clear underestimate of the power of OPEC. Massive investments in nuclear energy and coal were obviously necessary.

But we may today be committing similar errors by using the same models to continue into the future the relationships of the past. *It is rare, for example, to find energy scénarios which envisage a new doubling or trebling of the price of energy, with the change in production and consumption and in the mentalities, behaviour patterns, life styles which might become necessary.*³

Nor was 1973-74 the first energy crisis which the Western world experienced. In 1928 the gasification of coal and the exploitation of schists were already being seriously envisaged. The shortage of that period became a superabundance of energy with the discovery of oil in the Near East.

¹ See on this subject M. Godet, 'Énergie: compte à rebours, ou erreur de prévision', *Fuluribles*, No 22, April 1979.

² It should be noted however that in the various studies published in 1972 the Commission envisaged the hypothesis of considerable rises (corresponding for that period to a trebling of prices). See on this subject *Progrès nécessaires de la politique énergétique communautaire* COM (72) I 200 final; *Orientations et actions prioritaires pour la politique énergétique communautaire* SEC (73) I 4SI final; *Vers une nouvelle stratégie de politique énergétique pour la Communauté*, 1974. (Thèse studies have been published as a supplément to the EEC Bulletin under Nos 11/72, 6/73, 4/74.)

³ The Commission has shown the way with the report by J. Saint-Geours *Pour une croissance économe en énergie*, DG XVII COM 235 (79) F.

The error was unjustified. Its cause was an absence of imagination and reflection on the future. Similarly the ambitious energy programmes covering coal and nuclear energy launched after the Suez crisis in 1956 were not fully put into effect.¹ We should, however, acknowledge that the policy of encouraging cheap oil, despite its 'improvidence', contributed to the spectacular *économie* growth in the 1960s.

Today the majority of energy experts agree that the ultimate petroleum resources are between 200 and 300 billion toe (- an opinion which emerged from the Delphi survey, carried out by F. Desprairies with twenty-nine experts, more than half of whom were attached to the oil companies²). One must not, however, attach too much importance to similar analyses from experts in the oil companies, because they operate in the same way, according to the same criteria, and using the same basic data.³

Energy forecasters too often look at the future with eyes blinded by the present, and are led to revise their estimates⁴ constantly upwards. A Delphi survey would have given a figure of 50 to 70 billion toe if it had been carried out during the 1940s, and maybe double the figures in the following decade. Similar opinions do not signify coherent opinions, and in energy matters a consensus rarely makes a good forecast. However some key figures, which are incontestable and uncontested, constitute a solid basis for analysis.

2.7.2. The non-controversial data on oil

The importance of oil compared with the other basic materials is overwhelming. Exports of oil, which account for practically half the exports of raw materials, are worth more than ten times more than wheat, the raw material in second position, and twenty-five times more than iron-ore. Furthermore, the energy dependence of the industrialized countries has increased considerably over the last fifteen years, as can be seen from the following table.

¹ See on this subject the remarkable article by A. Ferrari and R. Laites 'Prévoir le passé: la rétrospective au service de la prospective énergétique', *Fultribles*, No 16, July/August 1978.

² A relative convergence, since the estimates differed by a factor of 2 to 3 in the survey.

³ See Michel Grenon, *La pomme nucléaire et l'orange solaire*, Laffont, 1978.

⁴ By the very definition of proven reserves they represent what can be produced under the existing *économie* and technological conditions, but the latter change. Furthermore, at an *économie* level, thirty years of reserves ahead are largely sufficient.

Energy dependence

(in %)

	1963	1973	1978
USA	6	18	26
Japan	60	90	89
EEC (9)	40	63	55

Source: Europe 90.

This dependence places a heavy constraint on their trade balances:

	Total net imports of fuels (USD 000 million)			Percentage of total imports		
	1973	1975	1977	1973	1975	1977
USA	6.5	22	40	9.3	22.9	27.0
Japan	8.2	25.4	31	21.4	44.0	44.3
EEC ¹	16.7	41.6	48.3	19.0	31.4	30.4

¹ Extra-Community data.

Source: GATT - Matrices of world trading (1978).

The industrialized countries are particularly dependent on oil since it accounts at a world level for 50% of the primary sources of energy, compared with 25% for coal and 20% for natural gas.

Irrespective of levels of economic growth and energy saving world consumption of energy is likely to be 12 and 15 billion toe by the year 2000 (as against 5.6 billion in 1974). The consumption of oil, which still represents about 50% of the total, will therefore rise from 3 billion toe to about 7 billion toe.¹

Under these conditions the cumulative consumption of oil in the period 1975-2000 will be 125 billion toe, or 25% more than existing proven reserves. This calculation does not, of course, take into account any future discoveries, but the stagnation of research activity outside North America does not augur well.

There is a fair consensus over the level of the proven reserves, since their definition is clear. They are estimated at 100 billion tonnes, of which 70% are in the OPEC countries, 15% in the planned-economy countries, 10% in the OECD countries and 5% in the non-OPEC developing countries.

¹ Source: Interfutures.

Coal is relatively *abundant*, resources probably being five to six times higher than those of oil. Furthermore its geographical distribution is very different from oil. The USSR, the USA and China own 90% of world reserves. However, coal is produced throughout the world at widely differing costs. European coal costs twice as much as American coal and five to ten times more than South African coal.

It was rightly emphasized at the world conference on energy in Istanbul in 1977 that *energy structures are very slow to change*. It has taken nearly a century for one form of energy to increase from 1% to 50% of the total energy balance-sheet. New forms of energy, such as solar and geothermal, will only be significant in the long term. This phenomenon is fully described in a recent study by the Commission.¹

2.7.3. The uncertainties of the future

If there is a relative consensus on proven resources,² there is no consensus on potential reserves or resources. Most experts suggest that exploitable resources will be totally exhausted in the first quarter of the next century,³ despite the uncertainty about geological regions such as the Arctic seabed and about the development of extraction techniques.

Others argue that such gloom is dramatically wrong, and that doubling the present price of oil would treble current reserves. They also add that the rise in the price of energy will encourage the non-conventional energy sources such as schist, liquefaction or gasification of coal, and will discourage consumption.

Whatever the situation, though, the experts agree that the oil market will continue to be tight in future years. This is partly because of lower productive capacity relative to expanding needs which in turn results from the inadequacy of research and exploration investment in recent years, and partly because the erosion of the external surpluses of the OPEC countries after each price rise will not be allowed to jeopardize their domestic development projects. We therefore expect a situation of latent or intermittent crisis, reflected both in terms of quantities and prices.

Compounding the uncertainties inherent in the oil market, there are also uncertainties over the production of energy from nuclear sources. The natural uranium market may be volatile during the 1980s because of

¹ *Crucial choices for the energy transition*, DG XII, May 1979.

² *Proven reserves* represent those which, with certainly, are immediately producible from existing wells, under present economic and technological conditions. *Resources* represent the estimated total of that which exists, but of which only a part could be exploited under present conditions of prices and technology.

³ On hypotheses of constant or increasing consumption (Interfutures).

political constraints which could affect the supply. This is true even in stable **OECD** countries like Australia, where arguments over aboriginal rights have held up exploitation. Efforts in uranium exploration need to be sustained if nuclear programmes are not to be slowed further. Furthermore, work on evaluation and listing is necessary to increase the uranium reserves, even if resources at present look sufficient.

It is generally accepted that nuclear energy is a *necessary step* in the transition from the oil era to the era of new forms of energy. But its development is under a permanent cloud of suspicion by large sections of public opinion.

2.7.4. The price of insuring against energy shortage

We are paying today for our lack of percipience in the past with increasing energy dependence, and our lack of an alternative to oil. Will we pay again in the future for our short-term poieies now?

The new price rises are only a problem because we were not prepared for them and because we hoped that the price of energy had stabiized. Certainly, économie slowdown has damped demand, and consequently priées, but the respite granted by the OPEC countries, and particularly by Saudi Arabia, so as not to aggravate the international dépression, could not have lasted whilst the surpluses of the petroieum countries were diminishing year by year, and when a déficit was forecast from 1980 onwards (see 2.4. The international monetary disorder.)

Everything now is happening *as if 1 lie West hoped to live with expensive energy in the manner that it enjoyed when energy was abundant and cheap*. Until this year, the car industry had never been so prosperous. Tourist travel by air is expanding more rapidly than in the 1960s.

In the United States, more than anywhere else, it has been as if the crisis did not exist, yet the *per capita* consumption of energy there is twice as high as in Europe. The 'Independence' project has been pigeon-holed and the Carter plan is encountering difficulties. The United States imports twice as much oil as in 1974, and heiped to increase world priées by granting a subsidy of USD 5 per imported barre! at the very moment when priées were rocketing in June 1979.

We are at the mercy of new and uncontrolled price rises. The security of our supplies is no longer guaranteed, so serious are world geopolitical uncertainties. The Saudi régime is unlikely to be any more solid than that of the Shah of Iran.

Of course, *rises in cost are not a bad thing in themselves*: At the end of May 1979 in Paris, Mr Schuitze, the principal économie adviser to Président Carter, told a meeting of the **OECD** Political Economy Committee

that the Western world had much to gain and **little** to lose in seeing the price of energy rise to higher levels, provided that these were reached progressively. *He added that the réduction in the price of oil since 1975 had in the final analysis proved unfavourable to the industrialized countries.* The new rise could 'encourage industrialists and private persons to economize on energy and to make the cost of new forms of energy profitable'.

Paradoxically, *the rise in the price of energy should be sufficiently rapid* to encourage research and development, energy saving, the improvement of classical technologies, and the development of new production technologies in nuclear energy and coal. But price hikes must be *sufficiently* progressive so that the economies of the industrialized countries can adapt. Sudden price increases hit hard. But we can no longer refuse to accept the fact that for the next two or three décades we will find ourselves in an era of increasingly expensive energy.

2.7.5. The technological prospects of meeting the challenge

If only to avoid the forecasting errors of the past, we must explore the possible *scénarios of major price increases*, which may be sudden or progressive, and draw from these the major implications for current account balances, *consumption*, and *behaviour*.

Because of the uncertainties in the oil market, and also for the prospects for petroleum substitutes, all the policies which can keep our options open must be explored. Any policy which proved irreversible in the face of changed circumstances could be very costly.

To recap, nuclear energy seems a necessary stage, though its development meets opposition from major sections of public opinion.

The security of our supplies is not guaranteed, and the geopolitical uncertainties are enormous. We are as a result at the mercy of new and uncontrolled price increases,

We agree with Mr Schultze that *price increases are not in themselves a bad thing*. Domestic government tax policy might ensure that the *rise* in the price of energy should be *sufficiently rapid* to encourage economies and substitution, but *sufficiently progressive* so that the economies of the industrialized countries can adapt themselves to it. That would help set an internal climate in which shocks on the oil market could be more easily absorbed.

Externally, Europe might take more care to assess the geopolitical risks to its supplies. A geopolitical 'map'¹ should be drawn up and regularly updated.

A true *North-South Dialogue*, and European-Arab coopération, is vital. Co-investment in supplies could be useful. Further investment not only in known resources but also in research and development into alternative sources are vital to whittle away at the inertia of energy structures.

Governments ought also to *prépare* for a *change in mentality* which might be necessary if new growth is to be less energy-hungry. This raises the sort of choices for *économie* and social policy which were clarified recently in the report by J. Saint-Geours (*op. cit.*)

At a technological level sacrifices will be necessary for an Apollo-style programme of research and development into the techniques of secondary and tertiary recovery of hydrocarbons, the gasification of coal, the recovery of low grade heat, deep offshore opération, nuclear fusion, geothermal and solar energy. A number of these technological developments *présent* risks which must be evaluated and minimized with new technological solutions. The exploitation of biomass and biological research work constitutes another avenue of development. Finally, major research work on energy saving including insulation, town planning and optimization of cheap-energy industrial processes is needed.

2.8. Raw materials shortages?

The *récent* history of raw materials falls broadly into three *épisodes*:

First, there was the calm of the 1960s. Then, cries of alarm from the Meadows Report at the beginning of the 1970s, and the almost *général* panic which was triggered off by the price rises of 1974.

Thirdly a relative calm has re-established itself. There is time to weather the storm, but no-one knows where or when it will break.

Basic materials account for 40% of international trade and constitute an essential resource for a number of producer countries. They are truly the foundation of world *économie* activity.

In order to identify the trends and constraints which underlie the basic materials economy it is pertinent to distinguish between *renewable* raw materials (of agricultural origin) on the one hand and *non-renewable* raw materials on the other. Amongst the latter we have already noted the *spécial* place of energy-producing raw materials. However, one can draw some *général* conclusions from the study of raw materials, taken together.

2.8.1. The common problems of the commodity markets

2.8.1.1. Specialization and interdependence Climatic conditions, the quality of soils and their geology have naturally led to geographical specialization in agricultural and mining activities. The corollary is the extremely complex and diversified global trade flows, with oligopolization of supply confronting much less organized demand.

Basic materials	Number of countries providing 75% of world exports
Jute	2
Rubber	2
Wool	3
Wheat, maize, cocoa, tea, tin	4
Chrome, hard fibres, rice, iron	between 5 and 7
Copper, lead, zinc, bauxite, coffee	between 8 and 10

2.8.1.2. The strategies of the actors: cartels versus interdependence Producers naturally attempt to add the maximum possible value to the basic materials. At national level, they try to control production relative to the needs of their development and to organize marketing, customs duties, taxes and subsidies, different prices for different markets, and bilateral agreements with consumer companies or States. At international level, producers attempt to improve their leverage over consumers by cartels and by splitting markets in order to maximize revenues. Product agreements are of very different types but cover in whole or in part exchanges of information on quantities produced, grades, stock levels, products and markets. They can also regulate market prices, by adapting the supply to the demand through quotas on production or exports and the establishment of regulatory stocks. Cartels have less successfully tried to fix world prices. Naturally they also aim to preserve their advantages by guaranteeing the stability of their export income.

By contrast consumers want permanent access to basic materials at the lowest price. The consumer States in general aim to *reduce their dependence* through protection and the development of national production, better utilization, reduction of waste and recycling, and the development of substitutes. They also aim to increase the *security of their supplies*. (Geopolitical diversification of sources, investments in production in 'safe' zones, the establishment of privileged relationships with certain countries or groups of countries and the establishment of strategic stocks¹).

¹ With the exception of petroleum and uranium only the United States has a reasonably systematic policy of strategic stocks, sometimes of enormous size (five months world consumption in the case of tin). The Federal Republic of Germany seems disposed to imitate them (see *Le Monde*, 19 June 1979) by establishing twelve-month stocks for domestic consumption in the case of 'sensitive' metals.

h is the 'force' relationship which results from the more or less happy implementation of these strategies which determines the terms of trade between producers and consumers and in the long term the trends in prices of the basic materials. The conclusion is clear: faced with producers who are increasingly organized,¹ and with the consumers increasingly greedy and either incapable or unwilling to adopt a coherent attitude, a *generalized real increase* in the dollar prices of basic materials, whether there is a physical shortage of them or not, must be expected.

2.8.1.3. Markets and postponed disorder¹

On top of this worrying tendency there is another problem at least as serious; that of the *fluctuation* in market prices.

Price fluctuations in raw materials, whether mineral or agricultural, are considerable. Zinc, for example, moved from UKL 250/tonne in June 1973 in London to more than UKL 650 in December of the same year, rose above UKL 700 in May 1974, and then fell to below UKL 400 four months later. The recent history of silver or sugar prices confirms this point. Market prices between 1973 and 1975 fluctuated between 1 and:

8.1 for sugar	2.9 for wheat and soya
5.7 for zinc	2.8 for rubber, copper and tin
3.6 for cocoa	2.4 for lead
3.1 for scrap iron	2.1 for platinum

The reasons for these fluctuations are very varied: general economic causes such as the strong world economy of 1973, followed by the general recession from 1974 onwards, special causes such as strikes at production sites or climatic hazards and structural causes such as better working techniques, or increases in financial, production and transport costs, or inadequate investments, especially in the mining field. However, the fundamental cause of variations in the prices of basic materials is often disguised in the organization of their markets. It may be groups of producers attempting to dictate conditions, as in the case of petroleum, or of institutions having sufficient power to control the cycles (in the case of tin). It may simply be highly speculative markets. Each market has its own mechanisms; but these are subject to similar rules.

The more basic factor in the market for raw materials rests in the *rigidity of supply* and of demand in the short run. This results in a quasi-permanent state of imbalance.

¹ Whist producers' cartels can be counted on the fingers of one hand the number of producers' clubs, and the number of members of each club, constantly increase.

³ See *Futuribles* No 20 February 1979 'Les matières minérales: vers quelle crise?' (M. Godet and O. Ruyssen) and 'Géopolitiques des ressources' (C. Guillemin).

The slightest suggestion of shortages leads buyers to accept prices which they would have rejected some weeks before.¹ The short-term behaviour of buyers does not all together square with the adjustment prices predicted by the classical mechanisms of supply and demand.

Rises in prices can lead sellers to reduce the quantities offered, in the hope of selling more at even higher market prices, whilst the buyers hasten to build up their stocks.

Price reductions can lead consumers willingly to exhaust their stocks, since their new supplies are ensured at a lower cost. By contrast, producers, mainly in the case of agricultural products, may be tempted to sell as much as possible before prices have fallen too far.

Another factor making for instability in the markets results from the contrast between the producer's ability (subject to finance), to cut or store his production, and the consumer's inability to cut consumption except where substitution by another raw material is easy to carry out rapidly.

In order to insure against the consequences of these sudden fluctuations, professionals cover risks on the futures markets, which makes it possible for some to stabilize artificially the fluctuating market price of a product. Others negotiate a producer-price, fixed either unilaterally by the producers or by agreement between producer and consumer associations. These prices fluctuate much less than market prices. Their modification assumes concerted action between producers, at a world scale, or within geographical zones, or cartels.

One can therefore have a producer-price simultaneously with a market price for the same product, but the market price is the more frequent reference point in delivery contracts between producers and consumers.²

The stabilization of income, if not purchasing power, from exports therefore remains *one of the objectives* for the producer countries. The results of the policies have however not lived up to the hopes. Agreements by products are legion, but they rarely survive the first serious crisis. It is only in the case of tin that producers and consumers have succeeded in building a viable commodity agreement. Compensatory financing by the EEC's Stabex System results in transfers from the rich countries to the poor countries, but their scale is still almost insignificant. The indexing of export prices to imported industrial products has always been categorically rejected by the industrialized countries, particularly the United States, and has become *taboo*. The preliminary negotiations

¹ Particularly in the case of crude oil, offered at the beginning of June 1979 at USD 35 a barrel on the Rotterdam market, whereas the 'normal' price of the same barrel was below USD 15.

² For example the London Metal Exchange plays a quite remarkable rôle in world trading in six basic materials. It is in fact the largest market for metals in the world where, each day, the international prices for copper, zinc, lead, tin, silver and now nickel are fixed.

on common funds and the integrated programme of UNCTAD at Nairobi in May 1976 and at Manila in May 1979 have come to nothing. It is therefore probable that any *économie recovery, even of restricted extent, in the industrialized countries, will be accompanied by commodity price rises which will help to undermine their recovery*. The lack of commodity agreements for basic materials perpetuates, in the short-term, a sort of 'Stop-Go' in the world economy.

These general trends in commodity markets differ in detail in the case of energy raw materials, non-energy minerals and agricultural products. The next section deals with non-energy raw materials.

2.8.2. Abundant but more expensive minerals¹

Minerals accounted for just 2% of international trade in 1979, but they have a special importance because of their strategic rôle. The LDC import twice as much as they export. Security of supply is vital, but in terms which are very different from those of energy raw materials.

2.8.2.1. Reserves and resources: adequate, extendable but badly distributed capital

Some 40% of global reserves lie in the industrialized countries, with four-fifths in the United States, Canada, Australia and South Africa. The Eastern bloc countries have 30% and the LDC some 30%. The regional distribution of these reserves is *quasi-monopolistic* for platinum and chromium (South Africa) for vanadium and palladium (USSR) and for columbium (Brazil). In the case of sixteen minerals, five countries have more than 75% of the reserves.

Relative to the growth in consumption, these proved reserves are *generally sufficient*. The ratio of proven reserves to existing consumption is largely greater than in the case of petroleum, except in the case of bismuth, mercury, silver and asbestos. However even for these the possibility of substitution, and new potential resources makes any risk of serious shortages a very distant one.

Potential resources for many other metals are enormous. It is estimated tentatively that it would take 25 million years to exhaust all the iron on the planet, 220 for cobalt and 1 500 for aluminium. Research companies have not pressed on with their prospecting and research when reserves are felt to be sufficient, and when they have been found in the industrialized countries.

Nor does the consumption of metals result in their destruction: a large number of them are *recyclable*, although a large part is permanently lost by corrosion, oxidation or by alloying.

¹ Excluding energy products.

2.8.2.2. *Priées will go up*

Whatever the reserves, the real prices of minerals may well increase for several reasons. Production costs *tend to increase*, despite technological improvements, as the most profitable deposits were the first to be used. The treatment of low grade minerals requires increasing amounts of energy, and the cost of other inputs such as plant, energy and labour are all rising. The same applies to the cost of ancillary services such as transport and insurance. It also seems that mining investments are currently *insufficient*. For aluminium, iron, copper, zinc, nickel and lead, the projected investments in the period 1979/83 are already 15 to 20% too low, taking into account both future needs and the likelihood that a high proportion of the projects now announced will never come to fruition. Furthermore the mining profits are being cut by the growth of production costs, and the often prohibitive character of the *political risks* in a large number of LDC leads Western firms to pull back to less profitable but safer zones.

On top of these underlying factors, there is often a *concentration of supply* in few countries, particularly South Africa and Zimbabwe, which permanently threatens the continuity of supplies.

Mining activity is also concentrated in the hands of *a few companies*, often North American. What is good for them is not necessarily good for the consumer.

Nevertheless, the industrialized countries and their mining companies do have *technological weapons*, which allow them to fix a *de facto price ceiling* for certain minerals. For example, the H^f process, developed by PUK,¹ involves the production of alumina from clay instead of bauxite. It could be widely used if bauxite becomes too expensive. The possibilities of exploiting *polymetallic nodules* could help with nickel, manganese and cobalt.² But these developments are currently slowed by the inertia of companies and governments, and by the need to make previous investments profitable, etc. In short, the limits which they impose on the rising trend of prices are more theoretical than real. The absence of organization of the market, as indicated above, also helps to *amplify and maintain* market volatility.

In conclusion the rise in prices of non-energy raw materials may be inevitable, but it will have consequences at a global level which are much less marked than in the case of petroleum. Furthermore, there is likely to be physical shortage in only three or four cases. The problems to be ex-

¹ Pechiney-Ugine-Kuhlman, a French transnational chemical firm.

² A study by the Economic and Social Council of the UN (Committee on Natural Resources, Geneva, 20 May 1977) showed that there were a minimum of fifty exploitable sites which could supply, from 1985 onwards, up to 15% of the world market for nickel, 17% of the manganese and 53% of the cobalt. However certain experts estimate that the exploitation of such sites could not for various reasons, take place for several decades.

pected in these markets will be cyclical, or will arise in the semi-finished products markets when covering capacities do not keep step with demand (as in the case of titanium sponge).

2.8.3. Agricultural raw materials

Basic foods such as cereals, tropical beverages, oils and stock-raising products, and industrial raw materials like rubber, timber and hard fibres, account for about 17% of international trade though 60% is exported by the *industrialized régions*. The MIC are totally dependent on imports for tropical beverages, rubber and certain oils but the reality of the 'force relationships' on these markets are mainly working in their favour.

Another characteristic of the market in agricultural raw materials is, however, more worrying. A fairly stable demand is faced by highly irregular supply, with price movements which are sometimes spectacular.

This is partly because agricultural production is subject to the hazards of climates and diseases, and because high prices during cyclical shortages tend to over-encourage production, leading to surpluses and plummeting prices.

2.8.3.1. *Compétition from synthetic products for industrial raw materials*

The problem of industrial agricultural raw materials is similar in many respects to that of minerals with one fundamental difference: the genuine existence of substitutes. During the 1960s, for example, the low cost of petroleum derivatives favoured synthetic products. The production of cotton increased by 1.6% per year between 1962 and 1974 as against 9.1% for synthetic fibres over the same period. This is the main reason why the industrialized countries are against indexing the prices of basic products. It would be illogical to maintain artificially the price of products which the market no longer demands. It is possible, however, that the rise in oil prices will hit synthetic substitutes, and that there will be a movement towards implicit indexing of the prices of natural products against those of their synthetic substitutes.

2.8.3.2. *Shortages in primary foods?*

From 1972 to 1975 the world food economy was profoundly shaken. As a result, the old debate on the equilibrium between supply and demand of food products has begun again. There are two theses: The 'optimists' argue that the food crisis resulted from a random and exceptional conjunction of external and internal factors, and that the trends observed over twenty years, together with the world's enormous agricultural potential should make it possible to feed the population of the globe in the next thirty or forty years. Cultivable areas can be extended, technological progress will continue and substantial gains from the better application of existing technology are likely. This period would allow the developing

countries to control their population and to adapt their economies. The 'optimists' see the return of relative calm from 1975 to 1978 as proof of the correctness of their view,

By contrast, the 'pessimists' are convinced that the increase in the supply of food is already constrained by the 'law' of diminishing returns and that it is steadily falling behind the growth of population. For them, the commodity boom simply demonstrated the contradictions in the world food system. The world will therefore experience, during the 1980s, a food shortage which will inevitably result in more serious market disorders.

In our view the prospects in this field do not seem very encouraging. The FAO in its report 'The world situation for food and agriculture' in July 1975 indicated that the net deficit in cereals of the Third World was likely to reach 85 million tonnes in 1985, and by 1980 these pessimistic forecasts had been largely confirmed. The global deficit of the LDC and the geographical spread of production between the MIC and the PEC make cereals the pivot of international trade negotiations. Agricultural production is also the motive power behind a powerful and organized industrial sector comprising fertilizers, veterinary products, plant protection products and agricultural machinery. The principal actors in this market are employing the means which they have available to extract the best advantage from the world food situation.

2.83.3. *Cereal strategies*

The United States is the leading cereals exporter. The American strategy is clear: ensure that American agriculture is available at all times to serve the interests of the United States, whether as import substitutes or as a weapon, as in the case of the recent limit on grain shipments to the Soviet Union after the Afghanistan invasion.

American policy also attempts to *assist the LDC*. This assistance consists in directing cereal surpluses to very poor countries under the food aid programme and also in transfers of technology. The United States thus contributes towards improving the food situation of the Third World, but at the cost of placing the beneficiary countries in a situation of political and technical dependence. The replacement of a System of multiple crops by single crops propagates the mode of Western consumption, which is not necessarily suited to local economies. Furthermore it secures 'agri-business' markets for American fertilizers, pumps and agricultural machinery.

The efficient size of American farms and their technological prowess are likely to ensure that the United States remains the guarantor of the world food order. Massive research and dissemination programmes continue under the auspices of both the State institutes and laboratories, and the major agri-businesses, which include the oil and chemical companies and the banks.

The LDC, in the throes of the 'green révolution', will attempt to establish balanced solutions which link technological progress, as plant varieties, fertilizers, pesticides and equipment, to *local* social and economic conditions. Some countries, particularly in Asia,¹ have obtained notable results as a result of cheap credit, training and the diversification of rural activities into cottage industries. However, in the majority of cases, improvements in the structure of land ownership and income distribution, have moved too slowly for sufficient gains in production to be expected, despite increasing support from the international community.

Moreover, farm policy is not free from ambiguities. Tariff reductions and transfers are accompanied by non-tariff barriers to sustain agricultural income, maintain the index of food prices, and to promote self-sufficiency. But on balance it is probable that the LDC will continue to run food deficits over the next ten to fifteen years, particularly the poorest amongst them. Interfutures also rightly emphasizes that other constraints could in the long term considerably disturb the world agricultural System. The fluctuations in harvests are getting worse, and are linked to climatic change. This in turn seems to be the result of increasing emissions of carbon dioxide and the possible destruction of the ozone sphere by the nitrogen oxides which are released by the breakdown of nitrogenous fertilizers.

2.8.4. High stakes for Europe; the technological prospects

What are the lessons to be drawn by Europe from this brief analysis of the problem of basic materials? The EEC is dependent on countries outside for 75% of its supplies of basic materials, as against 90% for Japan but only 15% for North America: *Europe loses and the United States gains from maintaining this status quo.*

Basic materials supply, however, will continue to be settled at an international level.

The concentration of the supply and the desire of producer States to preempt a larger share of economic power is not sufficient to support the thesis that new OPECs for raw materials will be created. In practice, no other basic material is comparable to petroleum. OPEC accounts for 80% of world oil exports, its principal members have large *financial reserves* to bolster the cartel, and their product *cannot be replaced* in the short term. Consumer stocks of oil are also *small*. It is precisely because of the developing countries' relative weakness in bargaining over non-oil commodities that they wish to deal with the question of basic materials

¹ South Korea has succeeded in establishing a permanent positive balance in its food supplies, due to a policy of supporting the price of rice.

at a *global level*. Nevertheless, the insufficiency of mining efforts and the rise in production costs leads us to expect *an increase in cost of mineral raw materials*, limited in only a few cases by the cost of substitutes.

The most important problem in the commodity markets is thus not so much rising prices but fluctuations in prices: the mechanisms of the market disturb rather than stabilize prices, and this instability affects the export receipts of the producer countries. With the Lomé I and Lomé II Agreements, Europe has played an innovative rôle in this area.

Excluding petroleum, the market-industrialized countries are the principal exporters of basic materials. This situation is, though, precarious because of the concentration of supply in the hands of a few companies or countries, notably South Africa. The threat of shortages for certain agricultural basic materials suggests that it is not exaggerated to speak of a 'food weapon'. Despite Europe's agricultural potential, it is less well placed than the USA in any such battle. Europe is also more dependent than the others for its supplies of raw materials and so has everything to gain by improving its position. This means, first, investing more in mining and the exploration of classical or other sources both internationally and domestically.

Secondly, encouraging international cooperation in the search for a global settlement of market uncertainties.

New techniques of exploration should be developed. We are not far, for example, from raw material prospecting by satellite or from the exploitation of deep-water deposits. Furthermore, a detailed inventory of Europe's indigenous resources, with the development of techniques for the exploitation of small or low-grade deposits, could contribute to a reduction of European dependence on raw materials imports.

The global shift in mining activities towards low-grade deposits may soon hit energy constraints or increasing water requirements. Research into low-energy technologies may be desirable. Technology could also contribute towards improving the substitution and recycling of both mineral and vegetable raw materials, for example with new varieties of protein plants. The biological revolution offers real promise.

2.9. Foil employment and productivity: More jobs are saved with the new technologies

2.9.1. The vicious circle: 'recession, inflation, unemployment'

Growth without inflation seems to be a lost paradise. Inflation, and even hyperinflation (24.2% per year in the United Kingdom in 1975, 17% in

Italy and 20.9% in Ireland), persists despite recession and unemployment. The following table compares the periods 1960-73 and 1973-78 for the nine countries of the Community.

European Community — Mean annual growth

	(in %)	
	1960-73	1973-78
GDP in volume	4.6	2.0
Inflation (GDP prices)	4.8	11.2
Productivity (per employed person)	4.3	2.2
Unemployment (as % of the active population)	2.2	5.5
Real per capita wages	4.8	3.2

Source: DG II. Doc. II/i 19/79-FR.

In today's Community not only does growth remain low at 3.4% over the period 1976-79, but *unemployment is becoming worse*. The unemployment rate has risen from 4.4% in 1975 to 4.9% in 1976 to about 5.5% now. Some 40% of the 6 million unemployed in the EEC are under 25. Moreover, though *inflation slowed* in 1978 (6.9%) compared with 1975 (13.4%), it *accelerated again* in 1979 and 1980 (14%). The Fédéral Republic of Germany and Bénélux are affected.

Productivity growth is still low, falling from 4.3% per year on average per employed person during the period 1960-73 to 2.2% over the period 1974-78.

This low growth of productivity has not prevented rising unemployment, and high unemployment has not prevented inflation. This phenomenon undermines the 'Phillips relationship' which still encourages many political economists to advocate the 'Stop-Go' policies which have only discouraged investment in our long-term productive capacity. In the recent past, the expansion of productive capacities and the introduction of technical innovations played a motor rôle in growth.

How can one escape from the vicious circle of recession, inflation and unemployment? This economic disarray is as bad as our experience in the energy field. The average annual GDP growth rate over the period 1976-79 was 3.4%, considerably below the 4.5 to 5% which used to be regarded as a minimum in the programme set by the EEC Commission. This rate of 3.4% over the period 1976-79 is very near the *pessimistic variant* of 3.3% which the study group on medium-term economic prospects presented in December 1975 and which was *rejected at that time as being socially and politically intolerable*.²

¹ The inverse relation between the rate of change in money wages and the level of unemployment, i.e., from a Keynesian viewpoint of cost-inflation between the level of unemployment and inflation.

² See DG I/1 19/79, *Problèmes généraux de la perspective à moyen terme 1979-83 et quelques implications*.

2.9.2. Contradictory imperatives

In the present and in the future Europe must attempt to reconcile increasingly contradictory requirements.

First, *the social need for employment*: to extend employment to a sufficiently large **part** of the active population in order to meet legitimate aspirations and to defuse social tensions. This **first** requirement becomes even more pressing since unemployment affects mostly the young. Moreover, in the period 1975-85, the EEC population of working age will increase by an annual 0.8%, or three times more rapidly than the 0.25% growth from 1955-1975.

Secondly, there is *the requirement of external balance*: Europe must export manufactured goods so as to pay increasingly large sums for the raw materials which it is forced to import. This opening-up to the outside makes competitiveness vital.

Thirdly, competitiveness requires *industrial specialization and increases in productivity*. Otherwise Europe will be outstripped by the United States and Japan, and also caught up by certain LDC and the Eastern bloc countries.

Fourthly, *the improvement of productivity requires technological innovation*.

The choice of specialization must also be sustained by technology. Europe does not have low wages or raw materials. It must necessarily develop the high-technology sectors which, without rapid growth, might save more labour than they use.

Fifthly, the need for growth requires concerted expansion if balance of payments problems are to be avoided. *Concerted action* between the various European countries is also needed to avoid incompatibilities between their industrial policies, and their R&D. Furthermore, if Europe wishes to expand in fields like aerospace and telecommunications, it will also need closer cooperation. A concerted foreign policy can help to make Europe a relatively stable zone in an increasingly turbulent environment.

The EEC countries must accept that a *headlong flight into growth, productivity, and interdependence* is the *only route which will make it possible to satisfy the other social and political requirements*. In reality, of course, there are apparent, if not real, contradictions between these priorities. We will be dealing with the two most important contradictions below.

2.9.3. The apparent contradiction between rising productivity and employment

2.9.3.1. *Matouk's theory*

Jean Matouk presents this apparent contradiction in the form of a theory: 'Employment is linked to growth. Growth is linked to the external balance. The external balance is linked to the adaptation of our industry'.¹

One could add a corollary: *the adaptation of industry takes place through rising productivity and the destruction of some jobs*. The conclusion is that long-term employment can only be assured through the destruction of short-term employment. In a period of high unemployment, this is evidently contrary to social aspirations. This conclusion is naturally somewhat too hasty. A quantitative and more detailed examination is required.

2.9.3.2. *The loss of jobs*

The économie departments of the Commission have simulated several variants of growth, productivity and employment. With low growth, a slow-down in productivity-increases per employed person implies, other things being equal, a réduction in employment of about half a million persons at Community level.² Thus it appears that when the increase in productivity is higher than the rate of growth unemployment can only worsen, on the assumption that working hours remain the same. The cause of productivity gains is most frequently technological change, and from there the statement that technology creates unemployment is only one step, all too frequently taken. In reality, *the 1960s showed exactly the contrary*. Technological progress created employment, reduced costs, and expanded markets, revenue and demand, so that the growth of the GDP in volume, at 4.6% per year from 1960 to 1973, was greater than that of productivity at 4.3% on average over the same period in the Community,

Today the trend in the Community is reversed, with productivity increasing more rapidly than GDP (respectively 2.2% per year and 2% per year over the period 1973-78). By the very definition of productivity, this can only take place at the expense of employment. The need to maintain external competitiveness seems to condemn Europe to a course of raising productivity and this, under the hypothesis of low growth, necessarily implies more unemployment.

2.9.4. Some solutions in a period of low growth

How can one escape from the contradiction between productivity and employment other than by a return, which seems less and less probable,

¹ Jean Matouk, 'Les voies de la croissance explosive' *Futuribles*, No 19, January 1979.

² See Doc. 11/119/79 — *Problèmes généraux de la perspective à moyen terme 1979-1983 et quelques implications*.

to high growth? Several routes could be explored. One possibility is to encourage more labour-intensive growth. The recent development of the United States may set an example. From the beginning of 1977 to the end of 1978 the total number of jobs in Europe increased by less than 100 000, while the USA created 4 million new part-time jobs and 700 000 jobs to provide better collective services at local level. Looking further back, one is struck by the fact that the USA created 15 million new jobs from 1960 to 1975, whereas the EEC countries created only 3 million. Yet the rate of growth in the USA was consistently lower than that of Europe.¹

There are several explanations of this difference between the United States and Europe. American labour productivity increased by 1.6% per year from 1974 to 1978, as against 2.2% in the EEC.

Wage increases in the United States were less rapid than in Europe, at 2% per year as against 3.2% over the period 1974 to 1978. And there was in general less protection of employment and regulation of business in the United States. We should point out, nevertheless, that the rate of unemployment in the United States remains high, being 5.8% of the actual population in April 1979, or 6 million unemployed, an equivalent number to that in the Community (see *Le Monde*, 31 May 79).

Since 1974, however, American employment has increased by 11.6%. (If the number of jobs had increased by the same percentage in France, there would be 2.5 million more jobs, or twice as many vacancies as unemployed). These jobs are naturally fragile, and the current recession in the United States is already causing much more dramatic job redundancies than in Europe.

The major difference of structure between the US and the EEC is that Europe has no industry on a continental scale, and the various national industries are engaged in merciless competition. Another difference is that the Community is much less protectionist than the United States. The average level of customs duties in the EEC is lower than that of the United States or Japan.

Nevertheless, Europe might draw some lessons from the American experience since the EEC is also an immense market of 260 million inhabitants which absorbs nearly 90% of its own production. The ratio of exports to GDP is 8% for the United States and 12% for Europe, if one excludes trade between the Community countries.

One possibility is to encourage what J. Delors calls a 'dual economy'. One sector is exposed to international competition and another is protected producing new services of either a marketed or non-marketed kind. One European response may be the 'informal economy',² which

¹ See G. Tardy, *Face à la crise, une Europe industrielle*, April 1979.

² See J.J. Gershuny, 'The informal economy, its role in post-industrial society', *Futures*, February 1979.

has shown spectacular growth in Italy and in the United Kingdom since the crisis.

Are we moving towards an extension of the merchant economy and a service society or towards the development of an informal economy? Taxation and legal protection for workers certainly encourage moonlighting, or do-it-yourself. These services are not always rendered for cash and if they are, prices and conditions are different.

The informal economy poses a basic problem for employment in the formal economy. The demand for services will not increase at the same rate as in the past. There will not be the same number of jobs created in services which until now have absorbed the employees released from manufacturing as a result of technical progress.

Another possibility is to reduce working hours, as the trade unions propose. But this route encounters several difficulties.

First, the competitiveness of companies must not be reduced. As a consequence, any cut in working hours, without a cut in wages, must be accompanied by offsetting gains in productivity. This in turn will eliminate the need for more employees. If cuts in working hours are to produce more jobs, they must be accompanied by cuts in wages.

Secondly, the reduction must be envisaged within the total annual duration of work. Each country and each company should be able to choose the formula, such as a fifth week of holidays or a thirty-six hour week, which seems to fit its production capacity best.

Thirdly, if the competitiveness of companies is reduced, any decision would have to be taken at a European level, because of the interdependence of all the EEC economies.

2.9.5. The constraint of interdependence

Paradoxically, interdependence explains why the crisis has spread, but the crisis has also accentuated interdependence. Openness to external trade makes European countries more sensitive to the international environment, and reinforces the need for concerted community action. But it also makes cohesion increasingly fragile. Each European country is subject, in differing degrees, to international disturbances. The responses each country develops will be different, and the sum of policies which are optimal nationally has little chance of corresponding to a coherent community optimum. For example, if all the countries in the Community develop national strategies of specialization in one or other sector there can be over-encouragement prejudicial to the Community as a whole. An example from the late 1960s was synthetic fibres.

The headlong rush to open up to the outside is necessary to pay for necessary imports, but it still presents dangers by making Europe less and less autonomous and increasingly sensitive to the international environment. The result is manifestly contradictory to the political requirement of building Europe as a zone of relative stability.

We must acknowledge, like Jean Matouk, 'that today the choice is between an *attitude open to the world*, with the risks which this entails, but also the opportunities which it offers, and a *protectionism* which, limited to the national level, can only lead to a failure to satisfy consumers who are deprived of some imported goods and obliged to change drastically their life-style, if only to reduce their consumption of energy. However, such a change, painful at the present time, might eventually lead to a life-style more harmonious with the ecosystem, more natural, and which ultimately guarantees more efficiently the survival of the species.'

Without going so far as to question our life-style and the open economy which necessarily results from it, one might recover rapidly a part of the domestic market by developing import-substitutes on European soil. Many costly imports such as soya or building timber are not essential. In sum, we need to rely more on our own strengths since interdependence increases the dependence of the weaker on the stronger. Inevitably, such a policy might require some extension of EEC protectionism.

2.9.6. The challenges for Europe and the technological prospects

Of course, low growth, unemployment and high inflation can coexist in the long term despite the use of a whole series of economic policy instruments. Europe is seeking to reconcile objectives which are in part contradictory, notably dependence on the outside world and internal harmony, rising productivity and employment.

The need for external competitiveness seems to require steadily increasing productivity which, on a hypothesis of low growth, necessarily implies more unemployment. That unemployment, however, will undoubtedly be less than the alternative: a deliberate brake on productivity growth, reducing competitiveness and creating balance of payments crises.

If unemployment is not to increase we must tackle the external constraints *without falling into the trap of systematic protectionism*. We must also

¹ 'Les voies de la croissance explosive', *Futuribles*, No 18, January 1979.

prépare for another socio-economic organization and other life styles. There are many routes to be explored:

- *More self-reliance.* The development of import-substitutes for example for soya or building wood, which is the second largest EEC trade déficit after oil, through sélective subsidy and protection.
- *A growth which créâtes more jobs.* Expensive energy means that labour-saving technologies, which use energy instead of labour are less attractive. AH fiscal Systems security rules currently encourage cômpanies to replace labour with energy. Taxes should encourage work but discourage energy waste.
- *A 'Dual' economy,* with one sector exposed to compétition, and a protected sector, directed particularly towards non-commercial activities and collective needs such as culture, éducation, health and maintenance of our natural and architectural héritage.
- *Work-sharing.* More flexible work schedules, including part-time work, optional retirement and work at home, with as much flexibility in life-styles as the microprocessor révolution can encourage.

Chapter 3: The *décl*ine and renaissance of Europe

3.1 Europe: Economie superpower, political dwarf

3.1.1 The renaissance of die old world

Some argue that the old world is justly named. Its power and influence are in relative *décl*ine, its birthrate falling, compared with the vigorous population growth of the South. Under these conditions, it is not surprising that the prophecy of a continued *décl*ine in Europe's influence is constantly reiterated.¹ The thème is clearly expressed by H. d'Hérouville: 'The retreat of the Common Market will continue. Europeans must overcome their divisions to *déf*end, for as long as possible, the remainder of their past grandeur in a world which is moving and expanding, and which is now *in*creasingly tending to pass them by...

The central *rég*ion of the world is not and will never again be theirs, but will be the Pacific. Some modern maps even push our old Europe into a far-off corner'.²

At the risk of surprising the reader, we are prepared to support the opposite thesis of the renaissance of Europe. The EEC continues to be the centre of gravity of the world, and is increasingly the centrepoin for the trade of the most of the other *rég*ions. In order to understand the significance of this European *rég*énération, we must recap some of the past. Since 1900 every period of relative *décl*ine in Europe's economy has been accompanied by a fall in world production and a contraction of trade. Any period when Europe's relative *é*conomie weight has grown has corresponded to an unprecedented period of growth in world trade and in the world economy. This phenomenon was particularly noticeable in the 'golden *â*ge' of the 1960s.

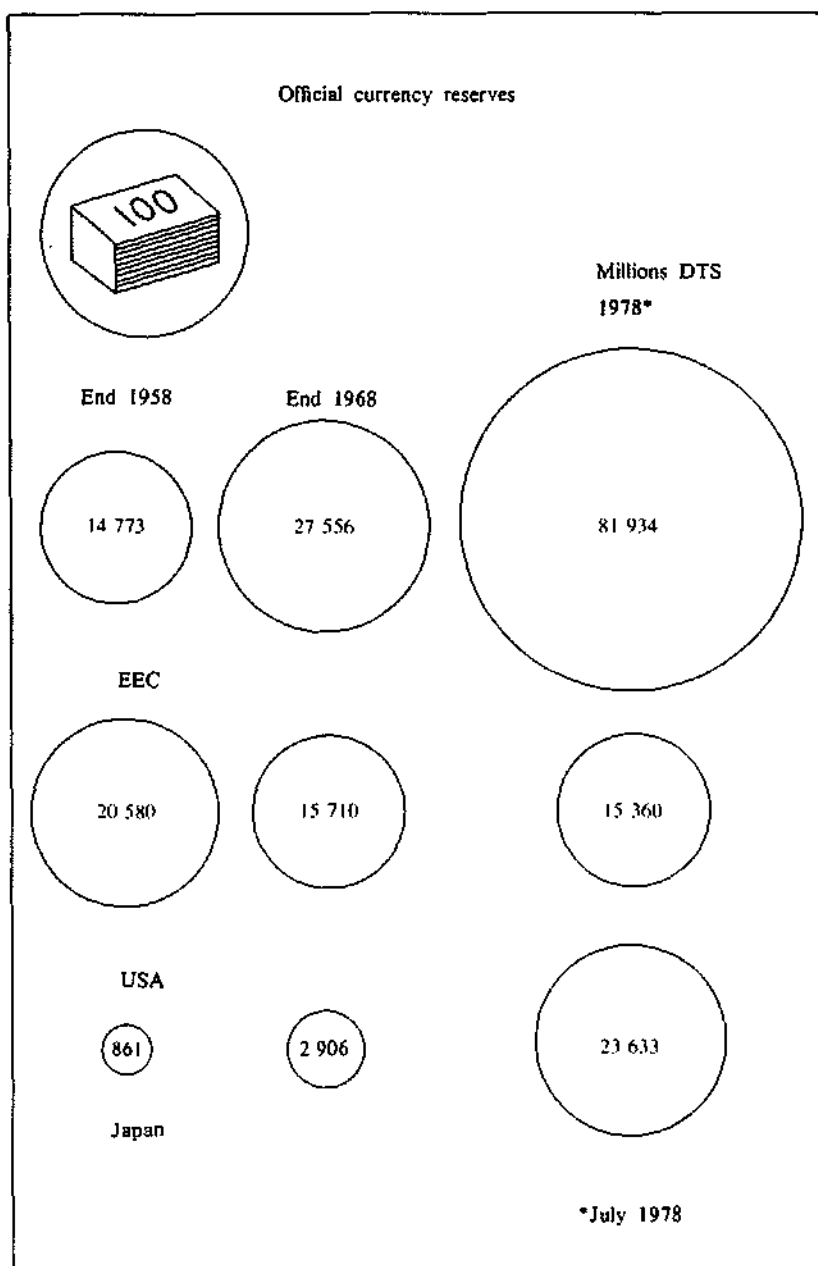
The growth in international trade is a good indicator of the health of the world economy. During periods of recession and slump, such as 1922-37, international trade actually increased more slowly than production or even fell. Again in 1975, world production fell by 2% but the volume of world trade fell by 4%.

From 1913 to 1938, Western Europe's share in international trade declined steadily from 55.3% in 1913 to 49.9% in 1926 and 49.2% in 1938. During the same period the world's *é*conomie growth rate slowed or even declined, and trade fell by 0.5% a year on average between 1929 and 1937. The same happened in 1975, when world trade fell in volume terms for the first time in twenty-five years and so did Western Europe's share in that trade.

¹ For confirmation it is only necessary to look at the list of the latest French works devoted to Europe: *L'Europe, c'est fini* (J. Fralon), *L'Europe sabo*îée (Yann de l'Écotais), *Pavanne pour une Europe défunte* (J.M. Benoit), *Plaidoyer pour une Europe décadente* (R. Aron), *L'Europe truquée* (Cl. Bourdel), *L'Europe interdite* (J.F. Deniau), *L'enlèvement d'Europe* (Ceres), *L'Europe suite ou fin* (Visine). (See G. Tardy: *Face à la crise, une Europe industrielle*. Revue Projet, April 1979).

² H. d'Hérouville *L'Economie Mondiale* PUF, collection 'que sais-je?'

The rise in the monetary power of Europe



Source: Services of the Commission.

By contrast, the good years of 1948 to 1974 went hand in hand with an increase in Western Europe's share of world trade. The relative decline of the United States compared with Europe and Japan made this phenomenon even more pronounced. The United States' share in the total GNP of the seven leading industrialized nations in the OECD fell from 64.4% in 1955 to 45.1% in 1975.

in short, the European barometer is in an infallible pointer to the health of the other regions of the world. When it is fixed at fine, and when the relative economic weight of Europe increases, the world economy, drawn onward by it, develops: when Europe goes into recession, the rest of the world swiftly follows.¹

On reflection, this is not surprising. The European Economic Community is the most populated of the major industrialized zones, the greatest commercial power in the world, the leading producer of automobiles, the second largest producer of iron and steel, the third largest producer of cereals, the largest ship-owner. The Fédéral Republic of Germany + Belgium + Denmark + France + United Kingdom + Ireland + Italy + Luxembourg + Netherlands: the arithmetic of tonnages or dollars adds up to impressive results. But is this just a statistical game, or is it a reflection of genuine economic, political and social reality? Furthermore, what are the chances of Europe overcoming its two major weaknesses, a shortage of resources and of defence potential?

The history of the founding of the European Community, with an analysis of its ambivalences, its challenges, its differences and its common ground, and also of effects of the crisis on the Community are all ways of providing some sort of answer to these two fundamental questions.

3.1.2 Necessity builds Europe²

3.1.2.1. *The EEC's history seen through its institutions*

At the end of the war, the desire to withdraw the two strategic sectors of coal and steel from the traditional rivalries of the nation States led to the Treaty of Paris on 18 April 1951, which founded the European Coal and Steel Community (ECSC). It aimed to assure the recovery and the expansion of European coal, iron and steel. The ECSC had its own resources: a tax, the first at a European level, on the value of iron and steel and coal production, and an executive which could wield extensive powers over the markets for these products.

The development of the two superpowers and the dismantling of the European colonial empires, made Europeans aware that disunity could

¹ Sec M. Godet, O. Ruysen - *The Times* 6 April 1978.

² According to the formula of Jean Monnet.

only end in impotence. The Suez crisis confirmed this analysis for the French, though it initially drove the British to seek a closer relationship with the United States. On 25 March, 1957, at Rome, the treaties which created the European Economic Community (EEC) and the European Atomic Community (EURATOM) were signed between Bénélux, the Fédéral Republic of Germany, France and Italy.

At first, the operating budget and the research and investment budget of Euratom were raised from contributions by the Member States together with those from the EEC. Then income from customs duties and agriculturai levies was progressively transferred from the States to the Commission itself. The excess of expenditure which was not covered by this income was met directly by the States according to the relative size of their national incomes.

In 1967, the merger of the institutions of the ECSC, EEC, and EURATOM meant that the budgetary System was in due course¹ financed wholly by the Community's own resources: customs duties, agriculturai taxes and part of the VAT,² established on a harmonized base which allows the Community to spend up to 1% of the VAT taxable base.

The 1978 budget thus represented 0.8% of the GDP of the Member States, broken down broadly as follows:

<i>Income</i>		<i>Expenditure</i>	
VAT	50%	Agriculturai sector	72%
Customs duties	30%	Other sectors and miscellaneous	22%
Taxes	20%	Administration	6%

The autonomous financing of the EEC budget is a good thing in itself, because it is in fact a transfer of financial responsibility from the countries to the Community for Community problems. But Community spending still only accounts for 2.7% of all public spending.³

Furthermore, autonomous financing also means spending within strict limits on income and borrowing. Unless the Member States raise the 1% VAT limit, the Community is likely to run out of its own resources in 1982. Customs tariffs are being reduced, so limiting the EEC's income

¹ Total autonomy has not yet been achieved: the basic expenditure on the development of the CAP, for example, does not appear in the EEC budget and is the subject of spécial financing.

² Today below 1%, imposed by the States and paid to the Commission.

³ The Community budget, as a percentage of the total national budgets of the Member States is équivalent to half the Belgian budget.

Source: *Les institutions de la Communauté européenne*, BEC, January 1979.

from that source. And agricultural levies on imports from world markets can fall dramatically if world market prices of agricultural products rise. On the expenditure side, farm spending which accounts for over 75% of the budget was, in 1975, 43 times its size in 1965. Régional, industrial and social policies to promote économie unity are likely if anything to be even more thirsty for cash, if not as uncontrollable.

In short, there is therefore a serious limit to the resources available for the European Community,

At the same time as the scope of its policies has increased, the Community was also enlarged at a geographical level. Denmark, Ireland and the United Kingdom joined in 1973. Greece joined in 1981. Spain and Portugal will be joining in due course. Finally, the élection of a European Parliament with a European mandate in June 1979 may further encourage the transfer of national responsibilities towards the Community.

3.1.2.2. *The stages in the construction: The leap forward, and cautions steps*

When forced by necessity, the European States have integrated at a relatively rapid rate.

In 1953 the ECSC suppressed customs duties and quotas on trade in coal and steel. This led to a doubling of trade in less than five years. At the end of the 1950s ECSC policy to convert from coal to oil was particularly active. Faced with the post-1974 crisis¹ in the iron and steel industry, the ECSC recovery plan, known as the Davignon plan, aimed in the short term to staunch the financial haemorrhage of the iron and steel companies by fixing compulsory floor prices for some products and by restricting imports. In the long term it aimed to restore productivity through modernization, diversification and the strict control of national subsidies. Redundant steel-workers were given grants to retrain and set up alternative employment.

The EEC made possible the free movement of labour and goods, with customs duties being totally abolished for the Six in 1968 and in 1977 for the three new countries. (The free provision of services has progressed rather more slowly.) A single customs tariff was drawn up for the rest of the world, and preferential agreements were concluded with the Third World under the Lomé and GSP agreements. The common agricultural policy (CAP) achieved to a large extent the five objectives fixed by the Treaty of Rome:

- (1) agricultural labour *productivity* increased rapidly by 8.8% per year on average from 1961 to 1971, and 6.2% per year thereafter;
- (2) agricultural *incomes* increased, though the gap between farm incomes

¹ In 1978 European production of steel was 15% lower than that in 1974, units operating on average at 65% of their productive capacity, and prices fell by 50%. The consequences of this were considerable financial losses, inadequate profitability and the dismissal of workers.

and other sectors remains, and the support price System has inevitably widened the income differential between large and small farmers, and between the Community's régions;

- (3) *security of supplies, 'reasonable' priées* for the consumer, and the *stability* of the markets were ensured for most products, though there was considerable criticism in the United Kingdom, at least, whether the security of supply was worth the high premium of 'reasonable prices'.

The fundamental principle of a single price in the Community market was ruptured, however, by divergent movements in European currencies. Seven different farm price zones were set up after 1971, though the establishment of the EMS allowed the price differences between them to be narrowed considerably,

The threat of currency instability to the CAP and the Customs Union, the two current pillars of Community policy, spurred renewed efforts to construct an économie and monetary union.

The Customs Union encouraged intra-Community trade and created an interdependence which is without précédent in the history of the continent. It was not, however, able to prevent currency fluctuations which have often been barriers which are as restricting as customs duties. The objective of a new économie and monetary union was clearly defined only after the summit conférences at The Hague in 1969 and Paris in 1972. The original ten-year timetable now looks a trifle over-optimistic.

The international monetary and économie crises practically killed off this attempt at birth. From 1972 to 1977, the only step was to safeguard, for good or ill, the CAP by creating the 'green currencies' and monetary compensatory amounts. The économies of the Nine became as divergent as their rates of exchange, except in the rise in the unemployed. It has not yet been possible to unité in the 'snake' or EMS ail the currencies of the enlarged Community, and even less so has it been possible to move towards économie union.¹

There are many reasons for this apparent immobility. It is difficult enough to agréer upon national measures when a général élection is imminent, but the Community's décision making has to contend with nine différent électoral cycles. The nation States still have a residual confidence in their own abilities to meet international challenges, and there is a mistrust of encroaching Community power in the two old European States with nationalist traditions, France and the United Kingdom. The uncontrollable nature of the Community's farm spending has also bred

¹ See the Marjotin Report of March 1975: 'Europe is no further advanced in the direction of économie and monetary union than in 1969. In fact if there has been any movement it has been backwards: national, économie and monetary policies have never been more discordant or more divergent over the last twenty-five years than they have been today.'

suspicion of other Community policies in the United Kingdom and the Fédéral Republic of Germany — the two countries which are most sensitive to financial issues.

Even so, there has been some progress towards intégration in what is too often painted as an over-dismal picture. The Nine's expérience with floating currencies, together with the gradual realization that national means alone provided no way out of the économie crisis, encouraged another attempt to regulate the EEC currencies in the European Monetary System.

The period 1977-78 was relatively calm on the économie front. Inflation subsided and most of the European countries ran a surplus on their trade. Some slight recovery could be detected. So in 1978, the heads of government decided to create a European monetary System (EMS). Central bank intervention was to maintain exchange rates within fixed limits against each of the other currencies. There was also a System of 'alarm bells' when a currency fell too far outside the central pivot constituted by the European Currency Unit (ECU) — a basket of all nine currencies. For the first time, countries were expected to change policy if the 'alarm bells' became persistent, and this could equally apply to a strong currency as well as a weak one, unlike the old Bretton Woods System.

3.1.2.3. *Contradictory (rends*

The process of EEC intégration constantly runs up against a multitude of contradictory impulses and trends. Though the Community possesses considerable commercial and économie power, its political weight on the international scène is still small by comparison. Certainly, a European foreign policy exists to the extent that the EEC's network of commercial agreements contains an implicit order of priorities. 'But the advances which the nation States have made through the 'political coopération' network are completely informal and unrecognized by any Community treaty. There is no defence coopération between the Nine at all.

Moreover, the Community continues to encounter the nationalisms of its members and the multinational opération of a good many EEC and American companies. Europe is multilingual and culturally diverse, while Europeans do not tend to speak more than one other European tongue, if that. Emargement to include Greece, Spain and Portugal is likely to bring a new crop of competing priorities for the EEC to meet. The Community also devotes over 75% of its budget to farming, which employs only 11% of its workforce.

Very few Europeans would recognize themselves as such: they are first Breton, Cornish, British or French. Furthermore, there is no consensus on what a future Europe should look like. The frontier between Community and national sovereignty remains imprecise. Should the EEC be a fédération of nation States, or of régions?

The balance between Europe's diversity, which has traditionally been one of its great strengths, and the need for cohesion is extremely delicate. The convergence of policy or law which is necessary for cohesion can often only be achieved at the price of uniformity. Moreover, the centrifugal forces within the old nation States are also growing, which might add another strain (or provide an opportunity) to the Community. Europeans are increasingly identifying with their regional cultures and traditions, after a period when mass cultures seemed to reign.

3.2. Divergence and convergence amongst the European countries

At the beginning of the 1970s most analyses concluded that the economies and social systems in the EEC countries were converging. The monetary, energy and economic crises which have affected Europe have, however, highlighted the very different capacities of each country to face up to change.

3.2.1. Monetary disparities

From 1971, floating exchange rates resulted in very rapid changes in the rates of exchange of European currencies. The Deutschmark emerged as a strong currency, with the French franc, pound sterling and Italian lira as weaker ones.

Under these conditions, all attempts to restore some monetary stability in Europe successively foundered. The EMS, established at the beginning of 1979, holds out *hope*, but is also a *constraint* which weighs more heavily on those less able to bear its burdens. Without painful restructuring of their industries, the lesser flexibility in the rates of exchange due to EMS could lead the weak-currency countries to chronic external deficits, or lower levels of economic activity.

3.2.2 Energy: Different situations

Two factors put the European countries into very different situations over energy. Because oil is priced in dollars, European currencies which are strong against the dollar can reduce its cost by appreciation. For example, in 1978 the real price of oil increased by 2.4% in terms of dollars but had fallen by 11.2% in terms of Deutschmarks.

Secondly, the increasing difference in degrees of energy dependence means that the interests of the various Member States differ. This does not encourage the establishment of a *European energy policy*.

Changes in the degree of energy dependence

(in %)

	Europe (9)	FROf Germany	France	Italy	Netherlands	United Kingdom
1969	55.0	43	64	78	48	44
1977	54.5	58	77	82	19	24

Energy imports and investments 1976-80

(in % of the GDP)

	EEC	D	F	I	NL	B	L	UK	IRL	DK
<i>Energy investments GDP</i>	1.65	1.20 ¹	1.42	1.43	1.61	1.27 ¹	0.82	2.77	1.89 ¹	1.03
<i>Net imports¹ GDP</i>	3.49	2.97	3.94	6.79	0.21	5.2B	17.59	1.88	7.36	4.25
<i>Energy investments + net imports GDP</i>	5.06	4.17 ¹	5.36	8.22	1.82	6.55 ¹	18.41	4.65	9.25	5.28

¹ Approximations.
¹ imports calculated at December 1976 prices or USD (constant) 95 per loc.
 Source: *Objectifs énergétiques pour 1990 et programme des États Membres COM (79) 316.*

Furthermore, the differences between the energy supply structures of the member countries are unlikely to be whittled away much between now and 1980. The United Kingdom and the Netherlands are exporters of oil and gas; though the United Kingdom will only aim to be a small net exporter after 1980. Apart from Belgium, where a quarter of the electricity produced is of nuclear origin, France is the only country in the Community that has actually accelerated its nuclear programmes for producing electricity. The Federal Republic of Germany and the United Kingdom have concentrated on indigenous coal, and Denmark on imported coal. The table above shows that profound differences in the degrees of energy dependence measured by international payments. The importance of imports and energy investments in relation to the GDP varies considerably from one country to another.

3.2.3. Economic and social convergence

The spectacular fall in the rates of growth, investment, productivity and employment has been comparable in all the EEC countries (see table

below). But this general movement hides some interesting disparities. *In the case of growth*, there was some slight convergence between the Nine during the 1960s, and considerable divergence just after the crisis. Since 1976 there has been convergence towards stagnation.

Mean annual rates of growth

(in %)

	Growth of the real GDP per person (employd)		Apparent productivity of labour		Gross formation of fixed capital		Employment	
	1969-73	1974-78	1969-73	1974-77	1969-73	1974-78	1969-73	1974-78
FR of Germany	4.4	3.3	4.0	3.3	6.2	0.0	0.6	-1.3
France	4.8	2.9	4.5	2.9	6.8	0.3	0.1	-0.1
Italy	4.4	1.5	4.5	1.3	3.0	-2.0	0.1	0.7
Netherlands	3.2	2.6	4.6	3.3	2.6	0.7	0.5	-0.1
Belgium	5.1	2.5	4.9	2.2	4.5	1.8	0.7	-0.2
Luxembourg	3.9	0.5			9.6	-1.2	3.5	-0.1
United Kingdom	3.2	0.9	3.1	-0.2	2.4	-1.3	0.1	-0.2
Ireland	4.7	3.7				0.6	-0.1	-0.2
Denmark	3.6	1.3			6.1	-1.6	0.9	0.3
EEC (9)	4.3	2.1			5.1	-0.3	0.5	-0.2
USA	1.6	0.4	1.2	0.1	3.3	3.1	1.6	2.0
Japan	8.6	3.0			12.4	1.0	1.0	0.6

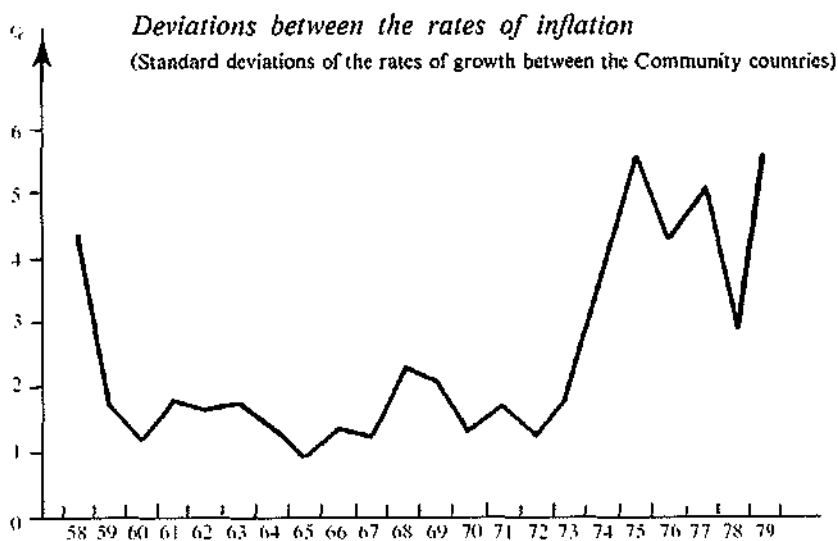
Source: Commission DG II: *La productivité dans la Communauté*.

So for example the rates of unemployment, previously less than 2% of the active population (except in Italy and Ireland) have now approached 5%, in this way showing a regrettable convergence.

In the case of investment there was considerable convergence over the second half of the 1960s, then a return to divergence since 1975. The divergences are greater here than in other cases. Insofar as investment is the motive force behind growth, *Europe is moving at different speeds*. For *employment*, there has been a net divergence since 1975 which contrasts with the relative stability of the 1960s. Furthermore, there are increasing disparities in rates of inflation. Since 1977, the inflation rates have converged. But major differences of more than 10 points continue to separate countries such as the Federal Republic of Germany and Belgium on the one hand the United Kingdom and Italy on the other. The difference in 1980 in year-on-year inflation rates was 14%-6% in Benelux and the Federal Republic of Germany, with 20% in Italy and the United Kingdom.

Furthermore, if there is a common market, there is in no sense a common price. If one extracts from Eurostats the prices of ten articles (out of

more than seven hundred) listed in autumn 1975 in the nine European capitals and converted into French francs at the rate of exchange at the time^the price disparities for the same product, from the cheapest to the dearest, range from 38% to 155% according to the articles. The capitals of the six founding countries of the Commdn Market do not always have the lowest priées. (See *Le Monde*, 26 May 1979.)



Source: Services of the Commission.

There are also différences in specialization and the capacities for adjustment of each country's industriat structures. The Fédéral Republic of Germany and the Netherlands specialize in products which are the least vulnérable to compétition from the Third World, in that they are intensive in skilled labour and capital, and have simultaneously abandoned slow-growing products to concentrate on the more promising sectors of world demand. By contrast, Italy and the United Kingdom have specialized in those catégories of production which are slowest-growing and often the most vulnérable. They have not preserved their competitiveness except as a result of the successive dévaluations of their currency. Between these two extrêmes France and Belgium occupy intermediate positions.

The most serious divergences between the European countries can be seen in their employment prospects. The average unemployment rates in the Community vary from 9% to 3.5%, falling to just 2.5% for German men.

The heaviest responsibilities on the political decision-makers of each EEC country are clearly to find solutions for unemployment and industrial restructuring. With the Community's cohesion in doubt and its countries advancing at various speeds, is the Community still part of the solution to the crisis or has it become part of the problem? A prolonged crisis could force some EEC members to seek an autonomous solution from which it is not certain that they would benefit, but which would certainly adversely affect their partners.

3.2.4. Transport policies

'Nearly twenty years have been devoted to the development of the common transport policy. But until now the results achieved are commensurate neither with the effort deployed nor with the obvious need to make progress in this field. It is, after all, explicitly cited in the Treaty of Rome as being essential for the success of the Common Market, for economic growth and for the rapprochement of the people of Europe.' Such are the opening words of an EEC memorandum.¹ Moreover, the gulf between objectives and results can only widen because international transport always develops more rapidly than short distance transport.

Transport is a key sector which conditions the location of private, public and industrial activities and the specialization of production.

Clearly, the development of transport activities *must be considered in the long term*. Potential demand for differing transport systems must be closely examined if the very large investments in transport infrastructure are to be justified.

Research into *the quality of the infrastructure of the European transport system* is fundamental, both as a spur to the physical and economic integration of Europe in general and to the economic growth of the least developed regions in particular. The Member States tend to underestimate the potential growth of traffic in cross-border areas, as inevitably their ministries operate within a national perspective. Obviously, an EEC policy must also attempt to ensure the harmonious development of rival transport means, such as road and rail, within competing economic, regional, social and cultural priorities.

One phenomenon should be especially considered. The new data-processing and telematic technologies may substantially affect the demand for transport. Commuter travel could dwindle as work, education and shopping become possible at home or in the immediate vicinity. Old

¹ *The rôle of the Community in the development of transport infrastructure* COM (79) 550 final, Brussels, 14.11.1979.

habits and cultural, psychological and social barriers might, however, hold back this trend. A changing pattern of work and leisure could also result in significant changes in urban travel.

Another area for policy attention should be the costs of transport, particularly in accidents and damage to the environment. Energy consumption will also be a major future constraint. Today transport consumes 15% of oil energy and 25% of the hydrocarbons. The electric car holds out some promise. But experts are pessimistic about alternatives to oil derivatives for road, sea and air transport. In all probability, the consumption of petroleum products by transport can only increase. Other sectors will have to find economies in oil.

In the field of *transport management* there are several threats to be met at a European level. A substantial effort in basic research on the techniques of forecasting and the behaviour of consumers is required if long-term strategies, infrastructure planning and local policies are to be made consistent with each other.

The state of the art in research often still ignores important externalities. More comprehensive cost-benefit analyses are desirable.

Enormous investments will be necessary because of the developments of new techniques like high-speed trains, the saturation of existing airports and air corridors and for long-postponed projects like the Channel Tunnel or the promotion of inland waterways. These investments compete because of the shared nature of the market. Care must be taken not to repeat in the international transport system the waste which has occurred in the urban systems of numerous European towns and which has resulted simultaneously in both gaps and duplications. A prospective approach to forecasting — described more fully in the Annex — can help to establish rational priorities.

Technological development also means that priorities must be constantly reasserted, as developments in different transport fields are uneven and thus change costs and benefits of different options. One example is the possible introduction of the high-speed train over the next ten years. This will require large investments, which will have to be justified by a significant increase in the demand during the 1990s. Parallel to this the introduction of large aircraft of the airbus type will result either in the reduction of frequencies — an outcome which travellers will not like — or lower rates of capacity use — an outcome the airlines will not like. A third possibility is an expanding air-transport market. However, this market is to a large extent the same as that for the high-speed train. The conflict and the need for corrective action should be obvious.

Another example is the various solutions for urban transport: electrically guided mini-tramways, suspended vehicles, track-operated mini-cars and so on. At present, it seems that none of these means is likely to replace the existing bus/tram/underground combination.

Sea transport will be characterized by fewer and larger ports, due to the widespread use of very large vessels which, until now, have only carried oil.

The increase in the number and the size of European inland waterways, such as the Rhine and the Rhône complexes, and improvements in the efficiency of barges, must also be considered when evaluating the future needs and costs of freight transport.

The negative effects of cars (accidents, fuel consumption, noise, pollution) will probably continue to be whittled away. The electric car might provide a solution to some of these problems, particularly for urban use. But we should not expect any fundamental change in automobile technology.

The absence of an EEC transport policy has led to the implementation of local or temporary solutions which can be contradictory, and could become an increasingly serious brake on the economic and regional development of Europe.

3.2.5. Ageing Europeans

The population trends are very similar in all the European countries, which makes the demographic problems rather more serious. Despite the forecasts of population *stagnation* at 250 million in 1975 and 260-270 million in 1995, the population of working age has increased three times more rapidly since 1975 than during previous years. The rate of increase was + 0.8% of the population of active age per year from 1975 to 1985 as against + 0.25% from 1955 to 1975. This will continue to be the position until 1985, when the falling birth rate will begin to reduce the active population,

Until 1990 the most important phenomenon is the *steady fall in the number of young people*. The percentage of those under 15 in the total population will fall from 23.5% in 1975 to 21.4% in 1980 and 19.7% in 1990. Over this period, the percentage of older persons, however, remains identical whilst the number of people of working age increases rapidly from 65% of the total population in 1980. There is thus a massive eruption of young adults onto the labour market between 1975 and 1985, whereas the number of people reaching retirement age is exceptionally low from 1980 to 1985.

After 1990 and up to the year 2000, we forecast *an increase in the percentage of old people*. The percentage of inactive persons reaches 56.4% in the year 2000. The active population will therefore be less numerous, and it may be necessary to encourage immigration.

There are some differences in the experience of each Western European country. The most noticeable is Ireland, a country of high population growth, and, to a lesser extent, Spain. There are also regional differences. The population of those between 20 and 60 will increase by 40% in Ireland, by 20% in the Netherlands, by 8% in the Federal Republic of Germany and by 16% in France. The fall in the population will first affect the Federal Republic of Germany, where the number of those under 20 will fall by 25% and the total population by 4% between now and 1990.

Several other trends are being reversed during the period, which will cause major fluctuations in the age-structure with an excess capacity in schools and universities, and a shortage in facilities for the elderly, which could cause difficulties for pension funds, amongst others.

The ageing of the population in Europe, compared with the vigorous population growth in the Third World, could make the geopolitical equilibrium more fragile. An ageing Europe may find it more difficult to adapt itself to the challenges which the young nations of the Third World will continue to pose.

3.2.6. Agriculture and its problems

Despite their contradictory interests and national policies the Six, and then the Nine, have managed to implement a common agricultural policy (CAP).

3.2.6.1. The background

The demand for agricultural products is stagnating because of low population growth and the saturation of *per capita* food needs. There remains *only one area of increasing final demand — that for high quality converted products*. The existence of a major potential demand in the Third World is not helpful, since it is likely to remain *insolvent*. Furthermore, the import requirements of the USSR and the countries of the Eastern European bloc remain uncertain. The increasing demand for 'input' products for stock-raising, like soya and cassava, cannot be met by the Community competitively in the present state of techniques.

Despite stagnating demand, *the supply of agricultural products* in the Community continues to increase, partly due to *technical progress and partly to the incentive effects of high support prices*.¹ The maintenance of high prices also stifles demand by encouraging substitutes, and this is a source of instability.

¹ Except in the field of constructional timber, where the Community has a deficit of 60%, the second largest deficit after oil, insofar as world demand is increasing much more rapidly than the supply, long-term tensions on the market can be forecast.

The larger farms required by technical progress are another threat to the environment, as they entail the disappearance of hedges, slopes and the modification of water courses. They also transform collective needs in rural areas. Larger farms are in many areas contradictory to the wish to maintain a certain density of population in the rural zones. (Though Bavaria is an example of encouraging small-scale industry to move to villages.)

Taken overall, the objectives of the CAP appear to have been achieved. But a certain number of difficulties or imperfections have appeared, which make some change desirable.

Farm productivity has increased *at the expense of jobs*. Agriculture occupied 9% of the active population of the Nine in 1978, against 17% in 1960.¹ Agricultural production's share in GNP has fallen from 8% to 5%.

Surpluses of sugar and dairy products coexist with deficits of soya and building timber.

Competitive distortions exist, to the benefit of countries with a strong currency and low inflation, despite the System of monetary compensatory amounts, the cost of which is now considerable.² *The gap between farm incomes, between countries and regions, remain considerable.* The CAP assists the rich more than the poor. For these reasons it seems that too important a place has gradually been given to intervention on the markets to maintain high prices *at the expense of improving the production structures.*

3.2.6.2. The prospects

The agricultural population is growing older. Despite retirements, however, the number of hectares per agricultural employee in the Nine will still be only about twenty-five in twenty years time. So almost irrespective of the agricultural policies which are followed, farms will still be small enterprises. Their average area only increased from 12.1 ha to 17.2 ha in the EEC even during the period of high economic growth from 1960 to 1973. This compares with an average farm size of over 60 ha in the United Kingdom, and 140 ha in the United States.

Under these conditions, *regional disparities are likely to persist* if not actually increase. Disadvantaged regions account for one-third of the EEC's cultivable area. The cycle of under-investment - under-employment - emigration - under-investment will tend to be perpetuated. As a result, arable land will continue to be abandoned and its soil impoverished.

At the same time, *the indebtedness of farmers* will increase because of the need to *replace labour with capital*, and because of the rise in the

¹ The figures are 11% as against 26% for the EEC of the twelve.

² 800 million ECU in 1978, or about 7% of the total EEC budget.

cost of capital and land relative to the lower rate of increase of farm incomes. The stagnation in agricultural incomes is likely to be accompanied by a stagnation in the export prices of the principal foodstuffs, because of the production capacity of North and South America. There may be temporary fluctuations, but world prices are likely to remain low.

The enlargement of the Community to the three Mediterranean countries will increase the number and influence of farmers with low productivity. The number of farmers will increase by 55% and the cultivated area by 50%; but the EEC's total agricultural production will increase by only 25%. Furthermore, the wines, citrus fruits, vegetables and olive oil which these countries produce will compete with the products of the EEC's existing Mediterranean regions, which are amongst the poorest in the Common Market. Moreover, there are already trends surpluses of wine and olive oil. This handicap for the existing Mediterranean regions will be partly compensated for by the enlargement of the consumer market. The potential for an increase in food spending in these countries is also greater than in the other countries of the Community.

Despite these problems, the EMS should contribute considerably to unified pricing in the CAP. But it will be necessary to add measures for the harmonization of agricultural incomes, through direct subsidies. The decline in agricultural employment can be restrained by policies to encourage part-time agricultural work and the development of other rural activities such as hunting, dietary products and farm tourism.

The processing of farm products is another promising direction. Europe should encourage a *new agriculture* (based on the new agro-food technologies). Long-term product policies seeking out targets for production, exports and imports, should aim for more balanced domestic supply and demand. In this respect, a *policy to encourage forestry* timber should be a priority.

The reduction of regional differences in living standards can be achieved through better social infrastructure, and with direct or indirect aids for farm incomes and prices differentiated according to the size of the farmer's production.

3.2.7. Regional inequalities

National economic convergences or divergences within the Community often mask profound regional inequalities. Community prosperity has remained very unequal and the 'harmonization' of standards of living remains an ideal. *Per capita* production varies enormously according to the regions, being less than half in Corsica what it is in Hamburg, whilst in Calabria it is only a sixth of that of the richest region of the Fédéral

Republic of Germany'. There are several ways of looking at this inequality.

Population density is less than 100 inhabitants per km² in most of the régions of France, but often exceeds 250 inhabitants per km² in the Northern European countries; Ireiand, the South-West of France and the southern part of Italy have very low *per capita* incomes. *The impact of industriel restructuring* varies enormously. In Scotland, Wales, Yorkshire, Lorraine, Pas-de-Calais and the Val d'Aosta, employment in the threatened sectors like iron and steel, coal, textiles, clothing, leather, footwear and shipbuilding is more than 20% of the total employment in those régions. In 1977 the *unemployment rate* was between 7.5% and 10% of the active population or double the Community average, in Ireiand, the Liège région, Sardinia, Lazio and Calabria; *youth unemployment is particularly bad*. In 1977, the percentage of those under twenty-five in the total unemployed of each région exceeded 50% in the whole of Italy (even 60% in North and Central Italy and Sardinia), in Auvergne, the Midi, the Pyrénées and the West, North and East of France.

The percentage is, however, lower than the Community average of more than 40% in 1977, against 25% in the period 1969-73, in most of the régions of Northern Europe.

The situation is particularly critical in two types of régions:¹

- (1) *The underdeveloped rural zones*: Their economy depends largely on agriculture and they are characterized by low levels of income and by high levels of unemployment, under-employment and émigration; public infrastructure of schools, roads, hospitals is deficient. One finds these régions mainly in the Italian Mezzogiorno, in Ireiand and in certain parts of France.
- (2) *Régions with declining industries*: Régions relying on coal mining, iron and steel, shipbuilding or textiles. These zones of older industrialization, with an obsolescent industrial structure and high rates of unemployment, are numerous in the United Kingdom, but are also found in France, Belgium and in other countries.

Some of these inequalities are likely to worsen. The regional population of working age is expected to increase considerably in some of the poorest and the least well-endowed of Western Europe's régions, notably Ireiand, Spain, Portugal, Southern Italy, Sardinia, Greece and the North and West of France. They are expecting working population growth of 10% a year until 1985. Freedom of movement for labour in the enlarged Community of twelve will entail considerable *migrations* towards the Fédéral Republic of Germany, the Paris région and the London région, where the population of working age is likely to fall by 5% per-year over the same period.

¹ *Dossier sur le développement régional et la Communauté Européenne*, No 10/79, May 1979.

Public expenditure and tax concessions are reducing regional income differences per head by about 30% to 40%, depending on the country.¹

But this inter-regional redistribution will remain limited since public finance cannot increase indefinitely.

3.2.S. The burden of public expenditure

Between 1960 and 1977 the share of public expenditure in GDP at current prices increased from 32.2% to 46.3% for all the countries in the Community. Two-thirds of this increase was social transfers, such as sickness and unemployment benefit. Almost another third went to administrations, to pay the salaries of officials and teachers, for example. The growth in transfer payments is the more spectacular.

Spending on defence fell as a proportion of GDP between 1960 and 1970, when it then, on average, stabilized. In France, the reduction was continuous from 1960. Public investment expenditure on roads, ports and so forth saw its share in GDP stagnate from 1960 onwards, and even fell in some countries, notably France, the Netherlands and the United Kingdom.

The financing of this expenditure was at the price of higher taxes and social security contributions and charges. Social security contributions increased from 8% of GDP in 1958 to more than 14% in 1977. Direct and indirect taxes rose from 22.7% in 1977 of GDP. The systematic recourse to budget deficits means that today interest charges on the national debt are near or even exceed public investment expenditure in Ireland, Italy, the Netherlands, Belgium and the United Kingdom.

At the beginning of the 1970s, many people felt that the proportion of public expenditure in the economy could not increase indefinitely. This is the main reason why the State is increasingly attempting to disengage itself from many of the responsibilities it acquired in the post-war years, as Frédéric Saint-Geours² emphasizes: 'The desire for disengagement is demonstrated by the public utterances of petitions, in the announcement of restrictive budgetary policies, and by results — a reduction in the demand for goods and services of public administrations in overall demand. However, the explosion of social services and the slow-down of growth reduces these efforts to nothing and causes the increase of the place of public finance in economic activity. In other words, the essential rôle now assigned to public finance policy is not an anti-cyclical rôle... but rather procyclical, with the desire to reduce the rate of increase of public expen-

¹ See the MacDougall Report: *Groupe de réflexion sur le rôle des finances publiques dans l'intégration Européenne*.

² Frédéric Saint-Geours ~ *Les finances publiques en 1985*, Futuribles No 21, March 1979.

diture running alongside the slow-down in économie growth, and risking its aggravation. This dominant attitude is shown by the réduction in the contribution of public administration to the demand for goods and services.'

A prolongation of présent trends could lead to public spending accounting for 55% of Community GDP in 1990. The levels reached today were, of course, regarded as unrealizable fifteen years ago, so the prospect of the increasing share of public expenditure in GDP cannot be ignored, particularly since a number of factors are likely to force it upwards: first, increases of services to the elderly accentuated by lowering the retirement âge (which will reduce youth employment). Secondly, the substantial increase in the value of family services, or part of a pronatalist policy to avoid falls in population. Thirdly, the increase in médical spending as a result of the ageing of the population and the increasing sophistication of médical techniques, and, finally, international tension and the threat of a new United States isolationism could force Europe, like Japan, to rethink its defence and increase its military expenditure.

In conclusion, the increasing prépondérance of public expenditure in the Community, if it is called upon to increase still further, cannot continue indefinitely without creating real social problems, such as the réduction of incentives and personal choice.

Chapter 4: A crisis of confidence in growth and science

Our examination of the various monetary, commercial, energy and industrial challenges with which Europe is now confronted has shown that the technological prospects in the fields of transport, energy, biology and microprocessors offer the best hope of fruitful research. That research is essential to meet the threats of the future, and to hold out the hope of a second renaissance in Europe.¹ Technological development is then our major challenge.

The need for growth and technological change may be all the more pressing, but ironically it is also meeting more public opposition.² Many current problems of the environment or finite resources are the penalties of previous technological success. At présent technological development solves more problems than it causes, but the picture could change if decreasing returns from technology set in.

Technological development, however, is more than ever a *prime necessity* because Europe needs to increase its competitiveness in the face of the other industrialized areas. There is no shortage of new technological 'révolutions'. We are to have microprocessors, biological processes and new forms of energy. Further in the future, we may exploit the océans; these developments give rise to hope with every rise in productivity, but also to fears for jobs. The new 'révolutions' contribute to the world's current uncertainty.

Taking into account the social limits on technology, what are the paths which one should propose for the Community's technological development? This is the principal subject we wish to consider in this chapter.

¹ A. Danzin, *Science et Renaissance de l'Europe*, Chotard et Associés, Paris 1979.

² In this document the words science and technology although distinct (not every technological development is the immediate and direct conséquence of a scientific development) are closely linked. So much so that the development of science cannot be studied and evaluated in a manner independent of technological development or vice versa, since it is increasingly difficult to establish a clear frontier between science and technology.

'There is no crisis in science, only a crisis in the relationship between science and society'.¹

Guido Brunner

Applied science is a crucial factor behind growth, but it is meeting new social resistance which is the more disturbing precisely because technological development is needed more than ever to relieve the economic threat with which Europe is confronted. We must export manufactured goods to pay for our increasingly expensive raw materials, and to remain efficient in the face of traditional and new competitors.

4.1. Science: The growth factor

It took an estimated eight centuries from the year 1000 for wealth to treble. At an average annual 5% GNP growth rate since the Second World War it has only taken twenty years for a second trebling to take place. Behind this unprecedented growth lies a formidable explosion of scientific and technological development. That marriage is so fertile that some 90% of the discoveries accumulated over the last three centuries have been made by men who are still alive.

The advantages of science and technology for growth and employment are confirmed by a recent study, carried out by the Commerce Department in the United States, which shows that technical innovation was to a large extent responsible for US economic growth from 1929 to 1969. From 1957 to 1975, the companies with the most advanced technology created jobs at a rate more than 88% higher than that of other companies, with productivity increases greater than 38%.²

In macro-economic production functions of the Cobb-Douglas type, as refined by Solow and Bensusan, technical progress is considered as a factor in growth in the same way as capital and labour.

If science is a factor in growth, we should be disturbed by the deceleration in the growth of R&D expenditure in the principal developed countries. In Europe, for example, the increase in R&D expenditure was 2.1% per year over the period 1972-77, compared with 5.8% per year between 1968 and 1971. In most of the Western countries, there is a dis-

¹ Report on the activities of CERD, 1978.

² See papers at the ESIST Seminar, Compiègne (France), 19-20 October 1978.

turbing coincidence between the slow-down in research efforts, investments, productivity and growth.

The causes and effects are certainly not simple to identify since, for example, the slow-down in research effort can also be interpreted as a consequence of the declining profitability of investment, and the decreasing returns of technology.

Moreover, some problems perhaps result more from a surfeit of technology, rather than from its inadequacy. L.S. Stavrianos points out that: 'The Roman Empire was hobbled by technological stagnation, but the problem facing the world today is the exact opposite: how to make rational and humane use of a powerful and proliferating technology.'¹

4.2. The costs of success: Technology on trial?

'The more efficient science becomes the less able it is to answer questions concerning the meaningfulness of human existence' (J.J. Salomon).² Science and technology have been the privileged instruments used by man to overcome his natural environment and to replace shortage by abundance.

It has provided food and clothing; it has shrunk distances and encouraged trade. It has eradicated a good part of the worst diseases that afflicted our grandfathers and has doubled life expectancy over a few decades. The slow-down which we are experiencing today is, after all, only a relative one: the low rate of growth of 2 or 3% per year remains higher than that of the United Kingdom in the nineteenth century when it was the leading industrial power.

But the spread of science and technology through society has also had negative effects which are becoming increasingly important where the environment, health, security and regional and social structures are concerned. *Shortages today are paradoxically a result of technological application and of changes in the environment.* Technology has consumed fossil fuels and mining resources; it has stretched the capacity of the physical environment to absorb waste; it has polluted our water, damaged our green spaces, violated our peace and quiet.

Does science and technology now create more problems than it solves? Our answer overall is undoubtedly no, but it might be yes in some special

¹ *The Promise of the coming Dark Age* — Freeman 1976, p. 7.

² *Science et Politique*, Seuil, Paris, 1970.

fields where technological saturation has reached critical thresholds. Some examples:

Productivity and leisure time

According to Bertrand Russell 'our society is one in which one learns to make twice as many pins in a given time rather than to make the same quantity of pins in half the time'-

In other words, productivity gains are converted into more material goods instead of into leisure time. The modern world is increasingly time-devouring. The paradox of transport is revealing: there are simultaneously fabulous increases in speed, but we spend more time travelling.

Technological progress and waste

There are two ways of achieving the economies of scale promised by the technology of mass production. Technology can extend markets but it can also reduce the effective life of products. Technology also encourages waste in another way, since it often costs less to throw goods away than to repair them. In practice 'technological progress tends to reduce the cost of production much more rapidly than that of repair work, since the first is an automatic process and the second remains a largely artisan operation.' Technological progress also precipitates the obsolescence of older products. It establishes the ephemeral in place of the permanent.

Size — complexity and security — control

The size, the complexity and the vulnerability of some sophisticated technologies encourage centralization and the concentration of decision-making powers. Nuclear plants require effective safety Systems and a protective force. This vulnerability arises less from the lack of reliability and safety of the Systems than from human errors or sabotage, and from natural disasters.

The power, scale and degree of sophistication of present technologies, particularly in the military, industrial and data-processing fields, are such that they require increasingly complex legislation. The urgency and the complexity of the problems and the decisions increasingly bewilder individuals. The margin for manoeuvre of the individual, and the choices for certain groups, shrink.

¹ Alvin Toffler: *Future shock*. Pan Books, 1970.

Some more spécifique examples provide évidence of technological saturation.

Fertilizers and agriculture

Some experts now want to abandon chemical fertilizers, pesticides and herbicides in the USA. This change might imply a considérable réduction in yields per acre; with the corresponding need to cultivate reserve areas. The result, however, would be to eut production by only 5%, while the income of farmers would be increased by 25% as a result of energy **economies**.¹

Medicine and health

The growth of médical spending, for example, of 10% per year in constant money terms in France, is not only a burden on public finances but is also having less and less effect on health. Life expectancy has now virtually stagnated, which supports the paradoxical hypothesis put forward by J.P. Dupuy and J. Robert as a result of the work of Ivan Illich. They argue that beyond certain thresholds any development in institutionalized medicine will necessarily result in a réduction in the health of man.²

in other fields, technological saturation has directly négative effects on society which results in opposition to science and technology. Before the green révolution in Mexico, for example, most of the land under wheat and maize could not be irrigated. Instead of developing seeds which could grow in unirrigated land, the seeds which were sown required intensive farming and irrigation. The 'miracle' benefited some large owners but condemned many small farmers to unemployment in shanty-towns.

A breaking point can be reached when the benefits of innovation in productive techniques are more than compensated for by destroying the productive base of the technology. Modern fishing techniques have resulted in the loss of the anchovy shoals off Peru. Over-fishing of herring and now of mackerel poses similar threats in the North Sea.

Despite some of the counter-productive effects of scientific progress, technology is not, however, generally on trial. Nuclear energy frightens people. Genetic control is worrying. Data processing can invade privacy and threaten jobs. *But it is science that public opinion turns to in order to solve our problems.* This is the overwhelming result of the recent surveys carried out by Eurobaromètre at the request of the Directorate-General for Research, Science and Education.

¹ Source: L.S. Stavrianos, *The promise of the coming Dark Age* — Freeman, p; 39.
² J.P. Dupuy and J. Robert: *La trahison de l'opulence* — PUF 1976, p. 39.

4.3. The conflict for the control of change

Even if one admits that there are limits to growth due to the limits of technology, technology is still the only answer if we are to emerge from the crisis. This real or apparent contradiction lies at the heart of the debate on the relationship between science, technology and society; it leads to a vicious circle where technology solves the older problems which it has partly caused by posing new ones. For two centuries science and technology has lifted the constraints of shortages and the natural environment; now it must solve the problems born of its own success.

Scientific activity has always had a tendency to develop exponentially with research effort doubling every ten years. Technology is therefore likely to satisfy the curiosities of its researchers, which are not necessarily the main requirements of society. But to satisfy social needs also implies the direction of technology, which presupposes choices on the part of society. Such choices become more difficult when the research undertaken today could be applied twenty or thirty years hence, and needs so far in the future are unknown. It is also the case that views on the relationships between technology and society are difficult to reconcile.

There is a fundamental conflict between materialist and post-materialist points of view.¹ Inevitably, the evaluation which one makes of the need for technology differs considerably according to one's viewpoint. Some recognize that science and technology has been the source of new problems and of ethical, economic, social and political conflicts, but that the balance sheet is still positive. With an emphasis on the 'revolutionary' scope of technical progress the jargon of the 'energy revolution' or the 'telematics revolution' or the 'new industrial revolution', they insist on the benefits of science: the increase in productivity, the rise in material well-being, the opening-up of a planetary civilization. They regard the future with confidence: science and technology will find, in their opinion, adequate solutions to future problems, provided that men are willing to adapt.

¹ Using the terminology of Interfinures:

Post-materialistic needs

- improvements in towns/protection of nature
- a society where ideas count more than money
- protection of freedom of speech
- a less impersonal society
- increased participation within the framework of life and work
- increased participation at a political level.

Materialistic needs

- a powerful national defence
- the fight against crime
- the maintenance of order
- the stability of the economy
- growth of the GDP
- the fight against rising prices.

Faced with the uncertainties of the future, they say: 'if they can put a man on the moon, why can't they ...'.

Others replace the word 'révolution' by the word 'crisis', speaking of the 'energy crisis', the 'ecology crisis', the 'économie crisis' and the increasing violence in our towns and cities. For them, scientific and technological progress as it has been used by our 'sick' societies has been characterized by the centralization and bureaucratization of power and the gigantism of organizations. The development-model of our societies, they state, has led to the perverse conversion of free goods into rare ones: pure water, pure air, pure food, non-alienated minds, tranquillity, conviviality, a sense of direction to life. The population has been inundated by 'goods' which are not only unnecessary but, which is worse, create needs and increase the dependence of individuals on each other and thus stifle personal development. Technocracy, a term which in their eyes frequently defines the dominant character of our developed societies, signifies the submission of man and his environment to the instruments of management and organization. These instruments have become a System in themselves, and are developing according to a logic which increasingly conflicts with the real priorities of man.

Under the influence of this critical 'post-materialistic' vision, science and technology have been increasingly rejected by the young and idealistic. A major breach in the consensus on progress has opened up. Some scientific and technological processes, such as brain surgery, genetic manipulation, nuclear energy, automation, electronics and telematics, arouse deep apprehension. People now demand the whys and wherefores of an innovation, in sharp contrast to the unquestioning 'just use it' of the 1950s and 1960s golden age of growth.

In some fields, of course, social innovation is better suited to solving problems than technological innovation. For example, solutions to the problems of retirement are currently often sought in medical technology and the supply of new services for the old whereas social innovation could provide other answers by making the retirement "age more flexible.

In conclusion, we might simply hope that the desire to mould science and technology to satisfy real needs and aspirations should not lead to the suppression of its research freedom and spontaneity.

4.4. The yields of technology

Labour productivity trends in the principal developed countries show a continued and almost general slow-down over the period 1950-70, and, since 1974, a virtual collapse in productivity growth parallel to that of

¹ 'In search of tomorrow's crises'. *The Futurist* — October 1977, p. 270.

GDP growth. A similar finding is true for productive investment and R&D expenditure over the same period. Are the returns to technology decreasing?

According to the thesis of the decreasing returns to technology put forward by many authors,¹ this reduction in productivity growth is a sign of a reduction in the opportunities for investment. It corresponds to the maturity of our current technology, which in turn justifies a lesser effort on R&D. What is, after all, the use of research if there is nothing major still to be discovered?

In support of this thesis, we should add that, contrary to the conventional wisdom, the time period between original research and final invention and innovation is getting longer, often because of the complexity of new technologies and the inertia of the society structures they have to penetrate.

Energy is a revealing example. The time required to replace petroleum is very long. This is why, apparently, nuclear energy is necessary. The market penetration of solar energy would take two or three decades. Because of this inertia, it would take several decades before any one form of energy increased from 1% to 10% of the energy balance sheet.

There also seems to be an increase in wasted research efforts. R&D can be unsuccessful, inapplicable or unapplied. One example is 'the abandonment in 1971 by the United States of the SST supersonic transport aircraft, which marks a turning-point in technical history. For the first time since the industrial revolution man had renounced what he was capable of doing',²

There are other examples of the decreasing usefulness of technological innovation. In transport, for example, the most important gains in time have already been realized. The aircraft is as nothing compared with the progress wrought by the railway, which made it possible from 1869 onwards to cross the United States in six days instead of six months by coach. Another example is the marginal and decreasing efficiency of fertilizers in agriculture.³

However, the prospect of new technological revolutions in microprocessors and bio-industry runs against the above thesis. *In some fields the utility and the yield of mature technologies are decreasing. But in others the yields are very much still increasing.* The cost of producing electronic

¹ See, in particular, Orio Giarini and Henry Louberge: *La civilisation technicienne à la dérive*, Dunod 1979.

² See P. Drouin: 'Prométhée au creux de la vague' in *Le Monde* 29.6.1979.

³ As emphasized by L.S. Stravianos, *op. cit.* p. 40: 'In US agriculture as a whole we now use about five times as much fertilizer as we did in 1947 to produce the same amount of crop. In other words, the efficiency with which nitrogen is converted into crop has decreased by 80% in that time'.

components is now being reduced by a factor of ten every five years, and this rate is not slowing down. If the automobile industry followed a similar development, cars today would be only a thousandth of their 1960 price.¹

It is thus still possible to argue that the relative réduction in R&D effort preceded the slow-down in productivity growth and is, therefore, its cause and not a conséquence. Furthermore, if one is to believe the advisers of the American Président,² the réduction in productivity is due not to the decreasing yields of technology, but to the increase in social costs, created by the multifarious législative and regulatory provisions for safety and the protection of the environment. Or to the enormous influx of young persons and unskilled workers into the labour force which, according to some studies, explains a third of the slow-down in productivity; or to the choice of less high-performance materials which consume less energy; or to the increasing share in GNP of the service sector, where gains in productivity are much less than in industry.

This latter point is cogent. Not only have the positive effects of the transfer of labour from agriculture to the more productive industries now run their course, but industrial employment is increasingly eroded by the increasing tertiary or service content of the economy,³ *We must here distinguish carefully the yields of technology and the obstacles to technology.*

The new phenomenon which could sweep away the prospect of decreasing yields in the tertiary or service sector is that for the first time for decades the technological révolution of microprocessors can potentially achieve spectacular productivity gains in the banks, offices and insurance companies. (Banks, for example, can extend electronic money, end chèques, and extinguish large numbers of jobs.)

We should also note in passing *that one cannot logically hold that technological yields are decreasing and that technological progress is generating unemployment.* Paradoxically, our doubts about the conséquences of technology for employment should reassure us about the yields of technology. *The new technological révolutions could multiply the effects on productivity* by attacking other factors which currently block progress, such as the complexity of large Systems, and the damage to the environment. 'The technologies of telematics and the biotechnologies are highly innovating, and are in fact capable of stimulating

¹ See Gunter Friedrichs: *Micro-electronics, a new dimension of technological change and innovation*, Paper présentée! to the Club of Rome, March 1979.

² See Annual Report of the Council of Economic Advisers, *Economie Report to the Président - January 1979*, p. 67, and following.

³ 'Le tertiaire représente plus de 50% de la population active en Europe. En part, l'emploi du secteur tertiaire a crû d'environ 20% depuis 16 ans, à ce rythme, le tertiaire représentera 65% de la population active en 1990, soit le taux actuel des USA'. DG II B/PhG/jm 12.3.1979.

innovation in other sectors. Their development results in an active *conservation* of natural resources. Furthermore very large production units are not necessarily required, and this makes it possible to avoid the négative effects associated with *very large scales*. Their thermodynamic yields are in général high and can be controlled at the biological or electronic level. Furthermore these technologies — the first as a result of the microprocessor and decentralized data processing, the second due to activities at a reduced scale often linked with agriculture — make it possible to arrive at a valid decentralization with the advantages which arise from this from the point of view of geographical equilibrium. *Decentralization*, in effect, leads to the better use of most resources: energy, materials, space and, in particular, labour."

4.5 The need for technological development; conséquences for employment

4.5.1. Productivity and employment

The relationships between technology, productivity, growth and employment provide scope for endless argument. We have already considered this question at some length, and have concluded that *when the rate of growth of productivity is higher than that of économie growth unemployment can only increase*, if working hours remain the same.

While it is true that formidable gains in productivity during the period of high économie growth in the 1960s were accompanied by almost full employment, it is also true that, despite the fall in productivity in the 1970s, unemployment increased because of an even greater fall in économie growth. In other words, *the gains in productivity* resulting from technological innovations made possible since 1965 *'the increase in industrial production without the création of jobs'*. And since 1973 exactly the opposite happened in the countries of the Community, as is shown by the R. Rothwell - W. Zegveld report.²

Even the fastest-growing industrial sectors no longer create employment. 'In 1976 the index of production of data-processing equipment in the Fédéral Republic of Germany was still at a level of 116 (1970= 100). However, by 1977, this index had climbed to 148.9. Despite this 28% explosion in production in one year employment in this sector actually fell by 4%'.³ Another example is the replacement of mechanical engineering

¹ Papers from the ESIST Seminar, Compiègne (France), 19-20 October 1978.

² *Technical change and employment* — Report prepared for the six countries programme by Dr Roy Rothwell and Mr Walter Zegveld - June 1979.

³ G. Friedrichs: *Microelectronics, a new dimension of technical change and automation*. Communication to the Club of Rome, March 1979, mimeo paper.

by electronic engineering in watch-making, printing and reproduction. Between 1970 and 1977 Fédéral German production increased by 12%, productivity by 43.5%, whilst employment was reduced by 23%.

Thèse figures show that it is difficult to claim that the determining factors of structural under-employment are to be found mainly in the constraints of the substitution of capital for labour due to labour market rigidities, such as the lesser professional and geographical mobility of women, or social security policy, or a redistributive tax policy.

Thèse social rigidities must thus share responsibility for unemployment. It is well known that some companies hesitate to take on new staff for fear of not being able to dismiss them if necessary. But they are not the primary cause of unemployment.

4.5.2. The need for technological development

It would be tempting to suggest an even greater slow-down in productivity to reduce unemployment. One way would be to delay technological innovation, so as to bring the rate of productivity growth below the GDP growth rate. Unfortunately this cure would undoubtedly be worse than the disease. Because of Europe's increasing interdependence and its need to maintain external competitiveness,¹ it must rely on technology to improve its productivity. To protect some sectors artificially and permanently would be to condemn them tomorrow. This is the result of the paradox of competitiveness and productivity. It leads to more unemployment today in the name of future jobs. There is another paradox: micro-processor automation could provide a solution to the crisis, but the crisis itself hinders automation.

In the absence of a return to a high rate of économie growth, *recourse to technology is vital, but it will aggravais unemployment. However, unemployment will rise less than it would do if technology was not introduced.* This hypothesis is valid at least until 1985. Between now and then the active population in Europe would increase at a rate three times higher than in the period 1965-75. Beyond that point the fall in the birth-rate might require immigration.

4.5.3. Impact of new innovations

While 'waiting for growth' unemployment will worsen because technological innovation will sweep the tertiary sector causing massive

¹ One can question this constraint, but it is in fact the entire socio-economic organization and life-styles which it is necessary to examine. See 2.9.1. Meanwhile recourse to technology is the only method if Europe is not to be simultaneously overtaken by the USA and Japan and be caught up by the developing countries.

gains in productivity,¹ According to one estimate, telematics could cut 30% of the jobs in banking and insurance.²

G. Friedrichs's conclusions confirm the finding: 'according to a very careful investigation done by the German Siemens company under the title "Office 1990... in public administration", big savings potentials were recognized, since 75% of all jobs can be standardized and 38% can be automated'. (*Op. cit.* p. 110). However, R. Rothwell and W. Zegveld, also recall that 'the predictions about employment that are now being made about microelectronics were being made twenty or so years ago about earlier generations of computers. The civil service has used computers for several years, and a study of the employment effect shows how wrong those predictions were'. (*Op. cit.* See p. 128 of their report.) The consequences of the microprocessor revolution on employment may eventually be more qualitative than quantitative. The example of the chemical industry shows that automation mainly replaces repetitive and semi-skilled tasks.

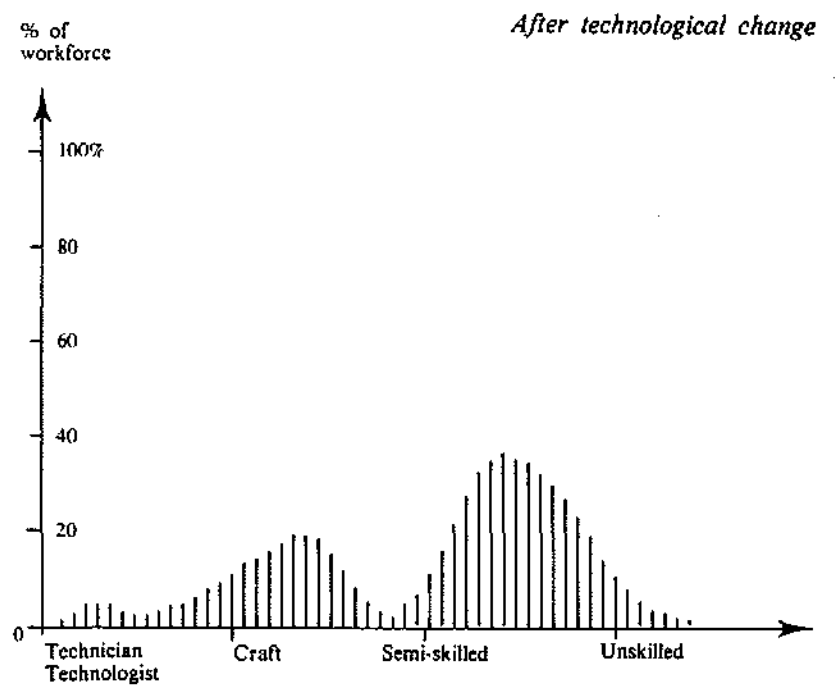
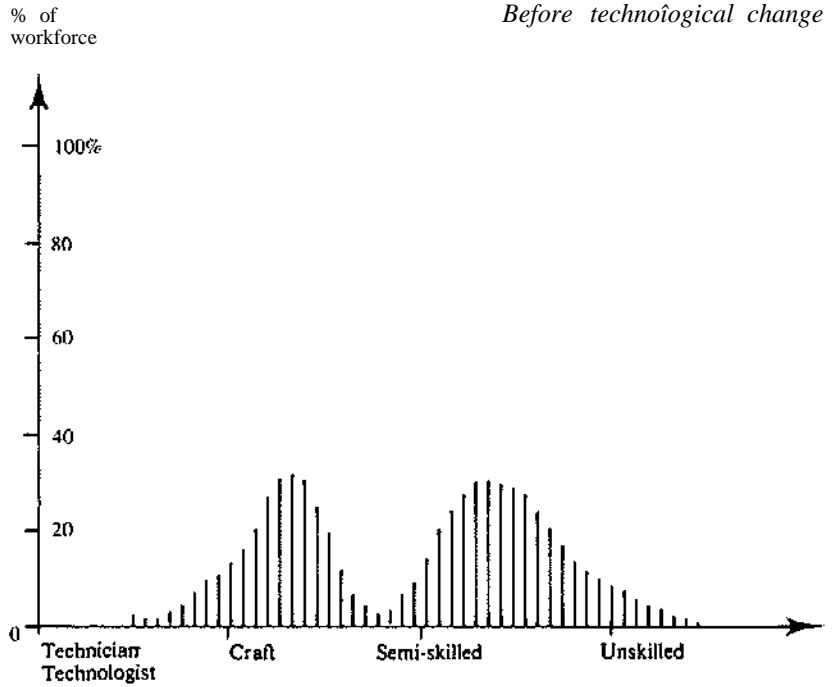
The textile industry suggests that technological change mainly increases the number of engineers and highly-qualified technicians at the expense of intermediate grades. Skilled labour is not reduced, as can be seen in the diagrams on the following page.

The prospect of making jobs more interesting ('job enrichment') will depend on the sector. It cannot, in any case, be achieved unless training is adapted to new industrial needs. Retraining will be essential. Furthermore the microprocessor revolution gives decentralization and production units of small size a new chance. And small and medium-sized companies create more jobs than the large. A recent study by Birch (1979) showed that two-thirds of all new jobs in industry in the USA came from companies employing fewer than twenty people, and no fewer than four-fifths of all new jobs come from firms less than five years old.³

¹ Paradoxically the development of the informal economy, that is to say that of production outside the formal market, is a response to unemployment but also constitutes a brake on the creation of jobs in the tertiary sector.

² See P. Nora and A. Mine: *L'informatisation de la Société*, Doc. Française, Paris 1978; Michel Godet and J.P. Plas: 'Les banques pourraient être la sidérurgie de demain', in *Le Monde* 20.2.1979.

³ *Op. cit.* p. 110. See p. 156 of the Rothwell-Zegveld report.



Source: *The economic and employment aspects of technological change*. John Fyfe, (in *Technology Choice and the future of work*, BA Symposium ~ 22 November 1978).

Chapter 5: The major technological changes in the next few décades

It is unlikely that a new 'technological innovation' which is currently undergoing basic research can be usable in less than ten to twenty years. So the principal forces for technological change in the next ten years are already in being. Without prejudging the possible impact of other fundamental innovations which might be developed in the short term, the significant fact in technological change until 1990 will be the acceleration and diffusion through the widest range of sectors of the main existing innovations. A principal characteristic of this change will be the transfer from men to machines of the control of operations and Systems, from the relatively simple to the most complex. The nature, conditions and consequences of the foreseeable technological changes remain to a large extent uncertain. They are therefore controversial.

We will consider here only three fields in which the potential for technological innovation and the consequent changes in the economy, social and political organization of our societies will probably be most significant in the next twenty years:

- (1) *the technology of information,*
- (2) *bioscience and biotechnology,*
- (3) *energy.*

Exploitation of the oceans will not effect us until much later. The prospects are none the less fabulous. Some experts estimate that 70% of the planet's resources are to be found under the oceans. Their marginal exploitation today could be developed quickly, not only in the case of hydrocarbons at depths of more than 200 m but also for mineral resources. The commercial exploitation of polymetallic nodules could begin at the end of the 1980s. Aquaculture could become to fishing what stock-raising is to hunting.

Space technology is often wrongly held to be unfruitful for major technological changes. This is perhaps true for the 1980s, but not for the following décades. Space technology presents an enormous reservoir of potential innovation for the future.

Europe should reinforce its technological cooperation in the other fields as it has done for space, where the European Space Agency has fostered cooperation, with the technological success of the Ariane rocket.

5.1. The technology of information¹

Under this heading is included every technology which can be used for: the création, conversion, storage, transmission, processing and administration of information, and the management of information Systems.

¹ Information, taken in the widest sense of statistical data, general understanding of relations on events, thought, etc.

It may be too exaggerated to suggest that between now and 1990 a so-called *information Society*, clearly different from our present industrial society in its productive power, social structure and value-systems, will be established. Nevertheless, it is true that our Western societies have already heavily invested in a process of '*informatization of society*'. The new information technologies use resources drawn on inventions for the transmission of information and, to a large extent, on electronics, such as electronic data-processing, automatic text-processing, measurement and control technologies. Progress in the field of semi-conductors (miniaturization, integrated circuits) has not been the only determinant factor; an important role has also been played by opto-electronics and display technology. The diffusion of information technologies has been the subject of detailed research in the United States (Parker, Porat) and also in the Community countries. Edwin Parker suggests that one should separate from the various other categories of active persons those specialized in the acquisition, processing or diffusion of information. He distinguishes four sectors in this way: information, industry, agriculture and services.

The diagrams show us the proportion of employees involved in different sectors in the USA since 1860 according to the conventional and the Parker definitions.

According to A. Danzin, 'these curves show the true change in the nature of employment which can be seen in the period 1955-65. It can be seen that, as from the 1980s, the total number of active persons employed in information will exceed the cumulative total of jobs of an exclusively agricultural, industrial or service character.'

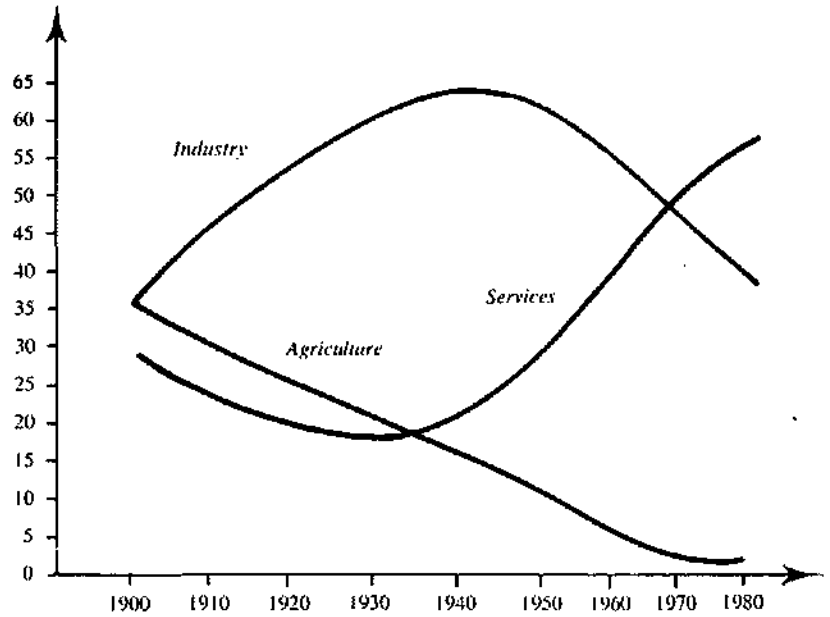
This phenomenon is also occurring in Europe. A similar classification used in research work carried out in the Federal Republic of Germany shows that employment linked directly or indirectly to 'information' accounted for 35% of all jobs in 1970. A more recent study² estimates the percentage of workers engaged in data-processing and telematics in the next five years at around 3 to 10% of the total employment and, in the long term, at more than 50%. These figures are, obviously, based on employment statistics of branches which are most influenced by such developments. They only indicate the probable amplitude of its direct impact.

The microprocessor is probably the most significant element in the 'information revolution', but it would be wrong to distinguish it from the other changes in this field. Whilst automation will endanger a large percentage of jobs in the private and public sector the 'marriage' between the microprocessor and the new telematic techniques, together with new

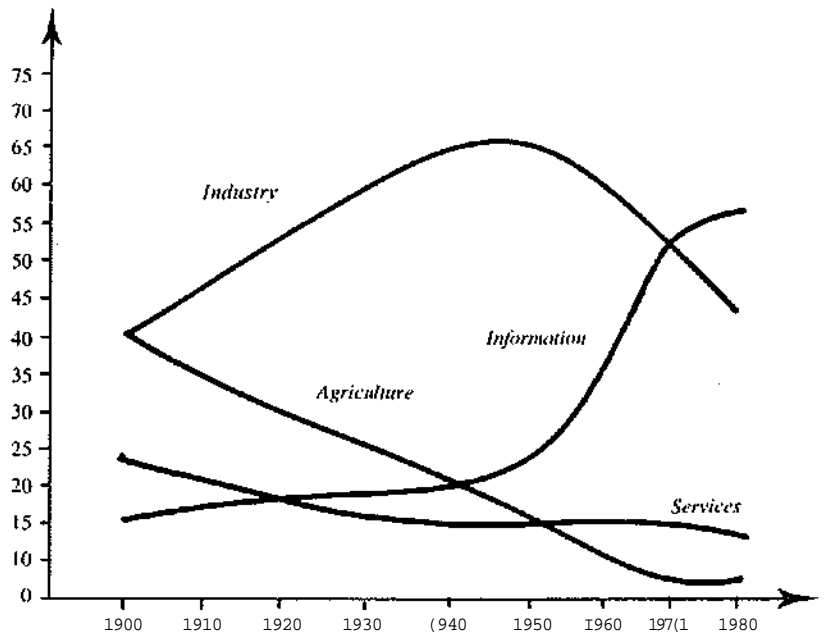
¹ Sec A. Danzin, *Science and the second renaissance of Europe*, Pergamon Press, 1979.

² Gesprächskreis Modernisierung der Volkswirtschaft, Elektronik, Produktivität, Arbeitsmarkt,... 1978.

Active population in the USA - breakdown into three sectors



Active population in the USA - breakdown into four sectors



Source: Paper presented by Prof. Edvín Parker to the OECD on 4 February 1975 (OECD Document ref. DTIS/CUG/75.1 dated 27 January 1975).

developments in 'information' in the productive sectors and the services, could open up enormous creative potential for data processing and telematics. This is, obviously, only on condition that their development is managed and controlled to match the socio-economic requirements of our societies.¹

At présent the microprocessor is the semi-conductor with the greatest innovatory potential. This predominant rôle of *microprocessors* is due, amongst other factors, to the scope of its possible applications in products and production processes in many sectors of the economy, including the service sector,² unlike most previous innovations; the cycle of innovation is also particularly rapid; and unlike other advanced technologies, microelectronics does not require large capital investments.

Clearly, one of the most important effects of data-processing / telematics will be its potential for increasing productivity in the services sector. The many reports and studies which are available show that the principal branches of tertiary activities which are affected are: banks, insurance and other office work. It is difficult however to quantify how many jobs might be lost in these fields.

New technology could affect up to 40% of administrative personnel. But the effective result on employment will depend on the extent to which these employées are retrained in more skilled occupations and become suitable for new types of service, as has already been the case in the banking System over the last ten years.

In two other sectors, social security and the postal services, the principal effect of an increase in productivity will be reflected mainly in simpler opérations, and a better quality of service.

As far as the agricultural and industrial sectors are concerned, the 'new telematics' will make the production System more like the service industries, with a higher proportion of skilled workers. In recent years, the need to produce increasingly different types and quantities of goods more rapidly has boosted the need for supplies at various stages of production, this in turn entails heavy investment in storage of inputs and outputs, the extension of distribution networks and the number of intermediaries.

¹ In général this is limited to listing zones in which it is assumed that new products, production processes and markets will be stimulated and/or created by EDP and telematics, specifying the nature and quality of the innovations, such as:

- leisure activities,
- communications and the mass média,
- data-processing.
- the development and management of energy Systems,
- security,
- medicine,
- military technology, etc.

² Central Policy Review Staff, *Social and employment implications of microelectronics*, duplicated, 1978.

Finally, of course, the financial problems linked to this development tend to mount. Management of the distribution system, the importance of which can only increase compared with the actual production system, will increasingly demand mastery of data inside and outside the enterprise and its branch of industry.

The microprocessor revolution is remarkable, too, because it creates gains in the productivity not only of labour but also of capital. The cost of components has been cut by a factor of 1 000 since 1960. It is because of this reduction in the past, which can also be forecast for the future, that the spread of the microprocessor should be rapid not only in the service sector and in households but also in industry. Therefore in most industrial branches the replacement of labour by capital must accelerate: the almost complete automation of production processes is no longer a fiction but a reality. Robot production lines already operate in the car industry.

Microelectronics will thus introduce a new element into international comparative advantage, since low wages are far less important when a production process is completely automated: *there is even a possibility that certain activities such as textiles will return to the developed countries.*

This, of course, brings us directly to one of the major problems associated with the microprocessor revolution; the possibility that it will destroy more jobs than it creates. But to restrain its development because of its short-term unpleasant effects on jobs and skills risks being far more damaging than swimming vigorously with the tide.

Competitiveness would be reduced, so that the exodus of certain activities towards the United States and Japan would be inevitable. At the same time, Europe would not profit from the creation of jobs in microelectronics. We would end up by suffering massive job losses in industry and in services.

This is the *real threat from the United States and Japan* which confronts Europe. At the end of the 1960s the Japanese government launched a vast microelectronics industry project, using the strategy of 'target areas', which has proved so successful in the case of steel, automobiles and consumer electronics. The United States, up to then in the lead, feared the new competition from the Japanese. In order not to lose this advanced position, 'the Defence Department decided on a six-year programme, directed towards the development and production of very high-speed integrated circuits, into which it poured USD 200 million, a large part of this (nearly half) being reserved for industrial equipment'.¹

¹ *La société européenne face aux nouvelles technologies de l'information: pour une réponse communautaire.* CCE DG III/1619/79-FR.

Europe must respond, and respond quickly, In a récent report on the impact of microelectronics on employaieut in Western Europe in the 1980s, the Institut Syndical Européen confirmée that a market economy policy for the electronics industry in Europe would not reduce our dependence on American and Japanese capital goods.

'In the United States and in Japan, governments hâve controiled and aided the development of the electronics industry. The governments of Western Europe must do the same within the framework of action coordinated and encouraged at a European level';¹ for this reason, the Commission presented a report to the EEC Summit in Dublin in late 1979, showing that the European industry has captured only 30% of the world market for télécommunications, 16% for data processing and 10% for components.

Furthermore, telematics {the marriage between electronics and télécommunications) opens up new product lines iike telecopiers, instantaneous data banks and video-texts which beg a host of questions. In practice only quantifiable information can be effectively computer-processed; qualitative information totally escapes the computer. The growing size of files is also a disadvantage. As their complexity increases, so the risks of errors become considérable, and détection of their origin becomes almost impossible.

The most disturbing feature is the '*reducdonist character of data processing*. It is very suitable for simple information, but it simplifies what is not simple ... depending on the précise keywords used in programming'. Certainly the microprocessor révolution can become really synonymous with 'decentralization, autonomy and increased respect for the individual',¹ but that will dépend on the development of personalized data processing, by contrast with telematics.

In conclusion, therefore, microprocessors and the 'new information society' are important because of:

- their positive and négative *multiplier effects* (on jobs and skills) in the industrial and service sectors, and on the international division of labour;
- their influence on the behaviour of consumers;
- their potential for *decentralization* of économie processes and services.

5.2. The bio-technological révolution

'Biotechnology' covers a range of fields: biochemical engineering, biogenetics, biological engineering, microbial technology and so on.

¹ See Jean Bounine, Bruno Lussato: *Télématique ou privatique*. Editions d'Informatique, Paris 1979.

Behind these various terms one finds the same concept:¹ 'The industrial treatment of substances by micro-organisms or other biological agents with a view to obtaining certain products and services. This includes fermentation and enzyme technology, the treatment of water and effluents, and some aspects of food technology. The *fields of application* and the *potential* are *enormous*, and, as in the case of microelectronics, new prospects and tangible benefits are to be expected due to increasingly *rapid developments*'

Since 1975, the departments of the Commission (Programme for Biology, Radioprotection and Médical Research, DG XII) have been fully conscious of these possibilities and have prepared, after many studies² and consultations with experts, a proposal for a Community R&D programme in the field of biomolecular engineering.³ According to Christian de Duve,² molecular biology will have industrial and agricultural applications, but it can also support medical research. He correctly emphasizes the importance of bioscience in understanding the secrets of cell mechanisms: 'In a simple cell, weighing less than one hundred-thousandth of a milligram, there is more chemical engineering than in all our plants and laboratories combined. Thirty years ago we had practically no idea of the molecular mechanisms which control it. Today the principal problems are solved. A decisive step forward has been taken'.

Amongst the many fields for research are some which are already clearly defined in the documents listed above. It is now possible to list some which could profoundly influence the productive apparatus, lifestyles and even the value systems of societies in the developed world.⁴

In the field of health and human behaviour, men can control the development of the embryo and the foetus and detect, if not prevent, malformations. The choice of the sex of infants will, very probably, be possible within twenty years. In the longer term, genetic engineering could make possible the production of thousands of genetically identical individuals. One could also, through the development of psychotropic drugs, control behaviour at will. Progress can be forecast also in immunology, with new vaccines, grafts and treatments of allergies, and in improving the physical and intellectual well-being of old people.

In the field of chemistry and pharmacology, it is possible to envisage the genetic modification of cells and micro-organisms (genetic engineering)

¹ See 'The living micro-revolution', A. Bull and J. Bullock, *New Scientist*, 7 June 1979.

² Rorsch study (Genetic manipulations in applied biology, Doc. EUR 607B), Thomas study (Production of biological catalysts, stabilization and exploitation, Doc. EUR 6079), and de Duve study (Cellular and molecular biology of the pathological state, Doc. CEE X11/112/79).

³ Doc. COM/79/793 final.

⁴ See F. Gros, F. Jacob, P. Royer, *Sciences de la vie et société*, Documentation Française, Paris 1979.

and the production of various substances (antibodies, immunizing agents, and also chemical products which are 'classically' produced under difficult conditions such as high temperatures and high pressures) from immobilized enzymes in bioreactors. It is also possible to envisage the modification of substances, such as the elimination of pesticides in foods and effluents. In the longer term the possibility of biochemical prostheses to carry out the detoxifying function of the liver and kidneys can also be envisaged.

In the field of agriculture and food, apart from biological fertilizers (the biological fixing of nitrogen by plants), phyto-regulators and biological pesticides, one can forecast the improvement of vegetable species to produce, for example, plants with rapid growth adapted to difficult environments or modelled as a function of need (short-stem cereals, or varieties with a long stem if one wishes to produce more straw, giant algae providing various by-products, etc.)- The improvement of animal species and the limitation of losses by the control of diseases and parasites are other probable applications for genetic manipulation. The biosciences have a major rôle to play in the energy applications of agriculture. Whether it is a question of the production of fermentable glucoses (providing ethanol) from wood or straw waste, or from the combustion or pyrolysis of suitable vegetables (rapidly growing trees), the use of biotechnology in various stages of the chain (germination, growth, reproduction, decomposition) offer enormous prospects.

In the field of resources, apart from the opportunities already indicated in the field of energy, we should mention not only the exploitation of the oceans, with the production of fish and marine plants, but also the prospects for biometallurgy. Certain bacteria are capable of assisting the production of soluble salts of copper, gold or uranium, making it possible to treat by lixiviation those deposits where the classical physico-chemical processes are difficult and costly. Furthermore, such bacteria would make it easier to recover the many minerals contained in sea water.

Finally, and without mentioning applications in the military field which are, as may be imagined, quite as important, one can already envisage what some writers term biocomputers (the storage and recovery of information by means of micro-organisms which can undergo transformations and which can carry out certain logic functions, etc.).

At the present, these prospects raise two types of questions:

- What will be, over and above the primary effects mentioned above, the consequences of the eruption of these technologies into our

societies? Will there be risks?¹ What will be the reactions of public opinion and the political powers?

— Will Europe be in the vanguard of biotechnological progress, both at the level of fundamental research, but also of applications?

The replies to the first question on the long-term socio-economic impact of the biosciences may be an uncomfortable one and require in-depth research. But the European effort in biotechnology can be viewed in relation to that of the United States and Japan. Japan already occupies a world monopoly in some fields such as the production of amino-acids by fermentation. This position results from a long period of research work, started at the end of the Second World War. According to certain estimates the exploitation of micro-organisms already accounts for about 5% of the Japanese GNP.

Due to its venture capital, the United States is beginning to exploit the various possibilities offered by twenty years of discoveries in modern biology. The major American companies, notably the *oi!* companies, have invested in biotechnologies such as bioreactors, pesticides and veterinary products. By contrast, European companies are less active in biotechnologies, as can be illustrated by the few examples set out in the table below.

Percent age of patents applied for by Europe, Japan and the United States

Estimates based on Doc. COM 79/793 final¹

Field	Europe	United States	Japan
Enzyme technologies 1969-75	20	50	30
Stabilisation of enzymes 1977-79	10	21	69
Chemical products obtained by fermentation	15	18	67

¹ *Op. cit.* p. 111.

Amongst the reasons for this European delay are an aversion to the financial risks associated with fundamental research. Its prospects are usually long-term. Other factors include the lack of venture capital, the shortage of skilled personnel, the inadequacy of homogeneous safety standards in the various European countries and the lack of any strategic

¹ In regard to the possible risks related to the development of biotechnologies we should mention the study carried out by Sargeant and Evans for the Commission (Hazards involved in the industrial use of micro-organisms, Doc. EUR 6349) which deals with this question and which indicates that the risks linked with the development of industrial activities on micro-organisms are no different in this field than in other industries, except in regard to certain micro-organisms which are capable of infecting the higher species; it should be possible to control this risk, provided that research is carried out and that appropriate and harmonized legislation is adopted.

vision in this field. However, the report *Sciences de la vie et société* points out that 'if there is one field which requires the closest coopération between European nations it is that of research into the life sciences...'. It is to explore this area that the research work of the Commission is directed. The proposai for a Community R&D programme in the field of biomolecular engineering¹ aims to tackle two major subjects, genetic engineering and enzymatic engineering. Its objective is the solution of certain priority problems for European agriculture and industry, fields which are particularly suitable for Community research. This policy should help eut the Community's lag in applying molecular biology to industry and agriculture.

5.3. Energy

We hâve already seen that the safety of our energy supplies is not guaranteed during the 1980s. Europe must continue to advance along three routes: concerted action with the producer countries, research and development into alternative energy sources, and the préparation for a real, moderate rate of energy-sparse growth. If there is to be a révolution, it will come mainly from a change in attitudes and habits. The rôle of technology is not to impose this change, but only to make it less difficult by adapting both the supply and the demand to the new conditions of our political, économie and social environment.

On the supply side, the technological options are clearly identifiable. We hope that a considérable impulse will be given to the new technological bases of a new energy system which will be required to reduce the dependence of the industrialized countries on oil. But, equally, we must not forget that this dependence is safer when it is diversified; world exploration has been too much concentrated in the last ten years in a few zones, *geôlogical maps* hâve nothing in common with *geopolitical maps*.

Nuclear energy, the gasification and liquéfaction of coal, and renewable forms of energy are other *options*, each of which hâve their advantages, disadvantages and uncertainties. But it is necessary to pursue them *simultaneously and intensively* to substitute as soon as possible for oii.

However, the significant fact is that neither solar energy nor nuclear-fusion energy, nor the exploitation of geothermal or wind energy, will effectively modify the existing energy system in the 1980s. The most profound changes will be in energy *use and priées*. Energy-saving will hâve an impact which is at least as important as the exploitation of new forms of energy. Meanwhile, ail our économie and industrial structures will be affected by energy innovations.

Since 1973, the authorities hâve succeeded in reducing some of the most outrageous waste. The second stage though will be less simple: it involves

¹ *Op. cit.* p. 121.

encouraging industrialists to invest in equipment which economizes on energy, and modifies production processes as well as products. The automobile field is a good example of this. Research on weight réduction (down-sizing in the USA), on the optimal control of the combustion cycle by microprocessors, and even on the design of the engine (the Jarret rectilinear engine, for example) could considerably change the physiognomy of the car, if not its use.

A return to coal, or even wood, could result, in a new wave of innovations in the chemical industry with new by-products which we have forgotten or neglected. However, steps back into the past are often almost impossible. Prop-fan propulsion makes it possible, but unlikely, to build short, medium and long-haul aircraft, highly économe in energy. Wearing a pullover could, in the opinion of experts, make it possible to reduce domestic heating by 20%, but habits die hard. Only by the widespread and progressive use of research and development efforts in all the possible fields, with the largest number of full-scale trials, will we be able to better manage the production, distribution and consumption of energy, and to adapt consumption structures to what is termed '*sober growth*'.

The report of the Saint-Geours group, *Pour une croissance économe en énergie* CCE DG XVII 235/79-FR, emphasized, 'It can be seen from the work carried out on technical possibilities for reducing energy consumption that the potential for improvement is considerable in the present state of our knowledge - evaluated at gains of 15 to 50% of the consumption according to the sectors. It is therefore important that we should exploit what is effectively a new source.'

5.4. Challenges and uncertainties

Our examination of the principal technological changes which can be foreseen is not exhaustive, but it does indicate those areas which should be the priority objectives of the FAST programme.

These new technological prospects amplify future uncertainty at two levels: first, uncertainty about the rate of appearance, pénétration and diffusion of the innovations. The microprocessor révolution is likely to concern the next ten years, followed by energy innovation because of the expected increasing real cost of oil. Bio-industry and marine exploitation, however, will take place at the latest at the beginning of the twenty-first century. Secondly, there is uncertainty about the real impact on the economy, via productivity, job losses, and new skills, and on our social life-styles.

Restructuring and adjustment will be painful and one can easily imagine

the conflicts which may accompany them within the Community and also in other parts of the world, particularly the USA and Japan. They will be worse as the sensitivity and perception of the problems and dangers linked to technological changes are not likely to weaken. 'Pessimists' and 'optimists' (each claiming to be 'realistic') will continue to oppose each other.

These are clearly major challenges. They involve the future of our societies. To restructure the productive apparatus, to carry out adjustments taking into account international competitiveness; these are the priorities of certain countries. To this others will ask: To do what? For whose benefit? At what price? Industrialists will insist, as a priority, on the constraints and imperatives of growth. Others will insist on the right to work, on living conditions, and on the aspirations of the population; yet others will insist on an ecological economy which safeguards environmental balances. Others again will insist on participation and the priority of social needs. From their side the public authorities, trying to carry out a function of overall economic and social regulation, will be confronted with opposite and worsening pressures and will be forced to make difficult choices. Everything will turn around the allocation of available and limited resources in the short, medium and long term, and on the type of technological development.

It will be doubly necessary to sound out opinion and to ensure that the fears of some, like the hopes of others, are carefully taken into account. As an example, we must expect, during the 1980s, an intensification of the debate and the conflict around issues such as:

Employment. Technological innovations will cause strong pressures to be exerted on the socio-economic structures of the Community, and will require a new industrial and social flexibility and mobility. In this sense it will be very important to stimulate not only the capacity for economic innovation in the economic sector, but also to create an optimum climate for necessary social innovations.

The limits to large-scale technological innovations. The industrialized countries could encounter increasing difficulties in the realization of vast technological programmes in critical fields such as transport, energy, food production and protection of the environment, because of high costs and social opposition.

The compatibility between the requirements of growth and the needs of regulation. The pressure for greater social and economic regulation of growth could introduce new 'constraints' on the economic development of our countries. Taking into account the environmental needs, will the necessity to reduce energy consumption and the demand for greater participation of individuals in investment decisions, necessarily entail a fall in productivity, a reduction in incentives to invest, or rigidities on the labour market? In what way will this influence the relationships between the

countries of the Community, between the Community and the United States and Japan, between the industrialized countries and the developed countries, each country and each group of countries being from now onwards engaged in technological and économique compétition which can only be described as desperately bitter? Briefly it is necessary to find a point of balance between socio-economic régulation and innovation.

Centralized control and individual liberty. Scientific and technological progress in the coming years will produce technologies which are increasingly powerful and sophisticated. They will allow Systems of organization which are increasingly complex. This development could be a source of libération of man and of greater créative participation of individuals in social, économique and cultural life. But it could also be reflected by more powerful and generalized subjugation of the individual to the central organizations of direction, management and control.

All these challenges of the new technological changes are considerable. More than ever, the public authorities have to sail between the reefs and choose between the contradictory requirements¹ of jobs, balances of payments, competitiveness, innovation and political cohérence. Their décision (or the absence of such décisions) have the power to orientate the future of our societies in one direction or in another. In this context the increasing inter-dependence between technological change and socio-economic development will give an increasingly important rôle to the attitudes of the public to technological progress. The renaissance was born of the Middle Ages; a new renaissance for Europe by the appropriate development of science and technology is possible, but it arouses as many fears as hopes since 'everything has happened in the past as if the success of each new species involves the disappearance of that which had immediately engendered it'.²

5.5. R&D efforts: Development and trends

Public intervention to promote technological innovation has been an important factor in all the countries of the industrial world. With sometimes significant différences from one country to another in the Community, the principal instruments of this intervention have been, broadly speaking, the same: demand, subsidies, régulation, the financing of infrastructures, and the universities.

Apart from the fall in the share of R&D expenditure³ in the national product of the major western countries, with the exception of Japan, one

¹ Sec. 2.9.2; our development on 'the contradictory imperatives'.

² A. Danzin, *Science and the second renaissance of Europe*, Pergamon Press. 1979.

³ By R&D we understand all expenditure on civil, military, public or private research and development.

can identify a certain number of structural trends. An *increasing share* is taken by the *private sector* in R&D expenditure. The distribution at the present time is approximately 50% private, 50% public. This trend, which may in certain respects be felt to be desirable, as companies are nearer the market and, consequently, better aware of its needs, does, however, reflect a disturbing phenomenon in most of the Western countries. The share of social transfers in public expenditure is growing more rapidly than the national product; this can only continue at the expense of investment and public research, whether civil or military.¹ The relative decline indicated above goes hand in hand with the importance of the *research effort* devoted to *military and space fields*. Civil spin-off must not be denied, but defence now represents more than 25% of the R&D effort in the United States and undoubtedly attracts the best research workers.

The research and development effort in the United States is 2.3% of its GDP, distinctly higher than that of Europe which is 1.9%.³ Japan occupies an intermediate position between the Nine and the United States, but because of the lower cost of research workers the same expenditure reflects a greater potential: there are 2.3 research workers per thousand inhabitants in Japan as against 1.1 in Europe.

The cuts in research have occurred mainly in the United States and some European countries such as France and the United Kingdom. By contrast, other countries, such as Denmark and Ireland, have upgraded their efforts so much that their research effort now tends to converge around a figure of 2% of GDP.

Within the EEC, research effort is very unequal. The Fédéral Republic of Germany, France and the United Kingdom share 80% of the R&D effort, though the Fédéral Republic of Germany alone accounts for 37% of Community expenditure as against 30% in 1965. France and the Fédéral Republic of Germany have changed their positions between 1967 and 1971. Another remarkable fact is that the British effort remains at a high level of 2.1% of the GDP, almost the same as that in the Netherlands where it is 2.2%. The enlargement of the Community will not increase the R&D potential of the EEC by more than 2%, of which Spain will contribute the greater part. The intensity of effort is 0.3% of GDP in Spain and Portugal and 0.2% in Greece.

The content of R&D appears very disparate, compared with the more homogenous efforts of the United States and the cohesive force of Japan.

¹ See the following articles: (1) Frédéric Saint-Geours: *Les finances publiques en 1958*. (2) Jean Pierre Poullier: *Analyse comparée des budgets sociaux dans les pays de l'OCDE*, Futuribles, January 1979.

² 'The comparison of *per capita* expenditure is even more unfavourable. It can be said that, as a first approximation, each European country has a volume of R&D which is lower than half the American level'. See A. Danzin, *Science and the second renaissance of Europe*, Pergamois Press, 1979.

The priorities in each country are very different: France and the United Kingdom are similar to the USA in the weight attributed to defence, space, aeronautics and atomic research, which take approximately 50% of the expenditure. The Fédéral Republic of Germany, the Netherlands and Switzerland are nearer Japan in the pre-eminence given to industrial research in sectors such as mechanical engineering, metals, pharmaceuticals, electronics and the chemical industry.

This specialization could be a positive factor if a study of the technological balance sheets did not show the relative weakness of intra-Community trading, with the United States as the common supplier of technology. The United States totally dominates the production and market for electronic components. Will the EEC be able to escape from the North American monopoly in the design and manufacture of microprocessors?

5.6. Implications for Europe

How can we ensure that Europe will maintain control over and the initiative in its own scientific and technological development? The alternative is to become a technological subordinate, dependent upon the United States and Japan? The response must involve a programme of Community action, concentrating on the following problems:

- Technology has reached critical thresholds in certain fields, and creates problems in some others. It is thus criticized by some social groups. A change in direction could be necessary in certain cases.
- Whilst in some fields, technology promises substantial development, it also seems to display a decreasing efficiency in others, mainly because of the barriers to technological yields.
- Technology can create jobs when it is applied to products; it threatens jobs, particularly in a period of low growth, when it is applied to processes and when it improves productivity.
- But technology is vital to improve productivity. Although it will aggravate unemployment, it will do so less than in the absence of new technology.
- The principal impact of technology will be the diffusion of existing innovations in the sectors of telematics, automation, bio-science, energy and, in particular, in the way they change social structures and needs.
- The amplitude of the changes which will result will be considerable, particularly at the social and economic levels. Fundamental choices will be necessary, for which we must prepare today.

- The R&D effort of the EEC countries is less than that of their principal competitors. Furthermore, it is unequally distributed. The EEC is penalized by dispersion and duplication of effort.
- There is a contradiction between the need to concentrate R&D effort and the desire to retain spontaneity and diversity in scientific and technological development.

Finally, *technology* is one of the *principal levers* which *could make it possible to meet the challenges of the future*. The promise of technology should not, however, make us forget the threats which could be posed. These could be acute, for example, in biology, which may threaten some species, and in the new telematics, which may threaten autonomy and freedom. It is essential to appreciate and meet these risks to avoid opposition to biology and telematics, and in order to take those measures which are necessary to accelerate technological development which, taken overall, can only be healthy.

Chapter 6: Conclusion: The management of risk and the mastery of the future

6.1. A hostile and turbulent world back-cloth

Beyond the many trends and constraints operating on Europe and its environments, one main characteristic of the coming decades seems clear: *the increasing geopolitical, energy and technological uncertainties*. No trend is certain and no radical changes can be totally excluded. As a consequence geopolitical, energy, industrial and food prospective studies are more than ever necessary, since the components of the world imbroglio are complex. It is difficult to see how they can be disentangled, if we agree with Daniel Bell, according to whom 'governments are in the process of becoming too large for the small problems and too small for the large problems'.

The *relative American decline* may continue at the economic and political levels and even at the military level; when several Third World countries possess atomic weapons it will in no way resolve the existing global disorder, but can only reinforce it. The bipolar world is finished. The *multipolar, pluralist world* will emerge only slowly, and the absence of a global regulator will be sorely felt. Japan is still too small to play this rôle, and the European Community is still too weak. The immediate alternative is to create different poles of attraction for each major region of the world.

The dollar is now more a disturbing influence than a stabilizing one. Faced with a monetary disorder institutionalized by floating rates of exchange, Europe has instituted a monetary zone of relative stability, through the EMS in 1979. We still do not know whether it can withstand the somersaults which wrecked the 'snake'.

The EMS undoubtedly represents a step away from the vicious circle. If it is successful, the ECU (European currency unit, based on a basket of European currencies) could, in tomorrow's multipolar world, play in its turn the rôle of a currency standard, or at least share this rôle with the dollar. The EEC, after all, is the largest commercial power in the world. However, the constraints which the EMS will impose will bear more heavily on those least able to support them. Without painful restructuring, the reduced flexibility in rates of exchange could lead certain countries into chronic deficits.

The probability — if not certainty — of wars and revolutions is bound to remain and it is to be hoped that the chain reactions resulting from these will not result in a widespread conflict. At the same time, the domestic problems in the Eastern bloc countries, coupled with the formidable *power of the USSR* and the unreliability, if not *withdrawal of the United States* on the world stage, poses more acutely than ever the issue of a real *European defence*.

A policy response to this trend is ever more urgent because the population of Europe represents only 5% to 6% of the world total. There are

several conséquences of changes in our population structure, including the ageing of our people. Apart from a reduced capacity to meet conventional external threats, there will be excess capacity in the educational apparatus, increasing needs for the elderly and aged, and difficulties for pension funds. In this context, the advisability of lowering the retirement age may be doubted.

Europe's ageing population, compared with the vigorous population structure of the Third World, could make a North-South dialogue more difficult and the geopolitical equilibria more fragile: it is difficult to see how an *'ageing Europe'* could understand, adapt itself and be imaginative enough to meet the challenges which the younger nations of the Third World will continue to pose.

There will also be a continuing contrast between a well-fed Europe with excess agricultural production, and the hungry Third World, Europe has a rôle to play in this respect; its domestic outlets remain limited. But how can it dispose of its production at prices two or three times those on the world markets, and to insolvent populations? The answer may be a European Marshall Plan to increase effective demand in the Third World, along the lines of the Brandt Commission's proposals.

6.2. The constraints on European futures

The era of expensive energy is only just beginning. Higher prices, though, are not of themselves a bad thing. We are today paying the conséquences for oil which has been too cheap for too long. It is necessary that the rise in prices should be sufficiently rapid to encourage energy-saving and replacement sources and sufficiently gradual for the economies of the industrialized countries to adjust.

Energy will be abundant, because it is expensive. But this does not in any way guarantee the safety of our supplies, which remain subject to political factors. Furthermore growth will be moderate and energy sparse or it will not take place at all. Energy-saving assumes a complete reversal of our patterns of life and of socio-economic organization.

In the long term, *non-energy raw materials* present problems which are quite as important. Despite the abundance of resources, *inadequate supplies* are possible. Since 1970, there has been a general slow-down in European capital's share in mining investments in the developing countries compared with those in the developed producer countries. However, the recent Lomé II Agreements move in the right direction, since they extend their guarantees to raw materials.

If the EEC will have to pay an increasingly large import bill for energy and raw materials, it must also face up to new industrial and technological challenges. *The stakes involved are quite clear; it is less a question of being caught up by the countries of the South, than of being overtaken by the United States and Japan.*

By developing the industries which are *most technologically advanced*, and which are in general capital-intensive, the market economy developed countries risk *aggravating structural unemployment*. The issue becomes the more important as we can no longer rely on the present tertiary sector to create jobs. The coming telematics revolution is more likely to reduce the number of jobs in banks and insurance companies.

The fall in the European birth rate will not be reflected in the active population until after 1990; meanwhile, between now and 1985, this population will be considerably increased. Increasing unemployment therefore becomes even more probable.

The redeployment of the industrialized countries is now all the more urgent since the more advanced LDC are going up-market to *relieve the new threat which is emerging within the countries of the South*. After textiles and the iron and steel industries the automobile, petrochemicals and aluminium industries could be amongst the new sectors which are threatened. Will the developed countries be able to adapt themselves to this new situation?

The reply seems affirmative for some of them: the Fédéral Republic of Germany, Japan, and even the United States and France. It remains uncertain for most of the other countries. Within the LDC, it is now conventional to distinguish the Fourth World from the more advanced countries; should such a distinction now be introduced between the various European countries? Would it not entail a general return to *protectionism*, traditionally the *weapon of the weak*, and which would deprive Europe of its rôle as the leading commercial power in the world, and which would contradict the Treaty of Rome?

Increasing economic, monetary, energy, industrial, social and regional divergences¹ present a problem insofar as it is the weakest countries and regions which need to align and to make the maximum effort, whilst these are just those which are least well armed to do so. For some of them, the social and economic cost of convergence will be too high, particularly in terms of unemployment. Without active European solidarity in transferring resources from rich to poor, these increasing divergences may lead to a *breakdown of the Community*.

¹ It is perhaps in respect of employment prospects that the most serious divergences between European countries can be seen: at the present time unemployment levels in the Community vary from 9 to 3.5% of the population of working age, falling to 2.5% in the case of men in the Fédéral Republic of Germany.

The permanent recourse to the Welfare State to meet people's aspirations for health, éducation and security and to limit social contradictions such as unemployment and inequalities, at the very time when the financial resources of society are stretched will tend to increase public expenditure as a share of national income, and therefore to increase the taxes and charges imposed on the population. If the weight of the State increases, its *efficiency, however, is reduced*. States have become rudderless.

Finally, European societies are confronted with the difficult choice between opening-up their économies to foreign trade and increasing their sensitivity to external influences, or limiting their trade and restricting their growth prospects. Compétition from the LDC presents problems to some industries, but also opens horizons to others. *The overall impact of compétition from the LDC on employment in the industrialized countries is neutral or even positive*; at least this is what émerges from most of the studies carried out. So the issue is how to convert inter-dependence into inter-development or how to reduce dependence, while stimulating development.

6.3. The promises of technology

It is vital for the Community to launch priority concerted action not only to manage the risks but also to master the possible futures. In practice, *technology plays a central rôle in meeting the économie, energy and industrial challenges* with which Europe is confronted. Mastery of technological development will be the determining factor in our future. Europe is often regarded as trailing behind the United States in scientific and technological development. But the scénario of a retarded and cultureless Europe is probable.

Europe, in its variety and its historical and socio-cultural diversity, seems more able to adapt itself to future change.¹ This is not so in the case of countries such as the United States which are too attached to a development model which for so long was easy and successful: 'contrary to the numerous statements of sociologists and historians, it seems to me that it is the United States which should come nearer to Europe and to the rest of the world in its ideology'.²

Beyond the économie threats, *Europe* is well placed to discover in its diversity those missing factors which will constitute the new development

¹ This hypothesis can be criticized - A. Danzin, for example, seems to believe the opposite.

² Orio Giarini and Henri Louberge in *la civilisation technicienne à la dérive*, Dunod, 1979, p. 2.

model. But the role of redirected scientific and technological development will be central, and will make possible 'a *réduction* of complexities and large-scales as an end in themselves, and the development of technology on a small scale, so as to open the way to technological and cultural pluralism, productive social and decision-making decentralization and lower levels of individual investments; a more rational use of energy and raw materials, including the replacement of energy by information; a less wasteful agriculture calling on advanced biotechnologies; the protection of health and the vigorous and harmonious development of the social sciences'.¹

Our *économie interdependence* means that expensive energy will doom energy-using 'labour-saving' technologies and encourage 'energy-saving' technologies. Until now, fiscal systems and social regulations have encouraged enterprises to substitute energy for labour. Suitable legislative measures are necessary, therefore, so that taxes encourage employment but discourage energy waste.

Rising productivity may aggravate unemployment, but less than stagnant productivity, especially since automation and the introduction of *microprocessors* could lead to a *change in the comparative advantages of countries with low wage rates*, and allow the relocation of activities like textiles to the developed countries.

Decentralization, autonomy, reduced scales and flexibility could be some of the key-words in the redirection of scientific and technological development around microprocessors. The priority recently given in the Community countries to the problem of innovation by and for small and medium-sized companies is a promising sign for the future, particularly for employment. Thus we can see the obstacles to a healthy return on technology decreasing,

Another priority for Community action could be the creation of companies of European scale which are competitive within Europe but, as in Japan, unite their efforts abroad. Despite the *économie crisis*, Europe has proved its relative dynamism by maintaining increases in productivity substantially higher than those in the United States. If Europe has to pay a heavier price in terms of productivity in order to remain competitive with the United States, this is mainly because of the *absence of a true common market for producers*.

Our study of the changes with which Europe is confronted has shown that *employment and energy* are the principal points of divergence and application on which the other problems hinge, and that two changes could profoundly change society during the next decades. These are the *development of the information society* and in the longer term the *biological révolution*.

¹ U, Colombo - ESIST Seminar, Compiègne, 19-20 October 1978.

Energy problems are already the subject of forecasting and prospective work within the EEC Commission. It is the responsibility of the FAST programme to integrate and to develop this work within a framework of analysis which recognizes the many different time-scales to which Europeans are subject, and which will highlight those R&D efforts which could, directly or indirectly, improve *work and employment*, which will be the major problem over the next ten years, and to prepare for the *information society*, the major change over the next twenty years. Moreover, R&D must seize the opportunities of the '*bh-society*'¹ the major change over the next thirty years.

To help manage these risks, seize opportunities, and to master the alternative futures open to a Europe experiencing change, the FAST programme should define alternative directions for research and development, taking into account three main issues.

1. The fact that Community policy in R&D remains limited, and concerns mainly broad directions, encouragements, and recommendations to develop an harmonious and coherent Community scientific and technological effort. The Commission of the European Communities only accounts for 0.9% of all private and public R&D expenditure in the Europe of the Nine, or 1.8% of the public spending on R&D.
2. The use of the specific characteristics of Europe. Policy should draw advantage from what are often regarded as handicaps, so that, as A. Danzin has emphasized, it is possible to use our limited space and high population density to promote research on rapid and economic transport systems over medium distances.
3. The preservation of our capacity for adaptation to future changes. As a consequence, we should develop research work which will improve the flexibility of our economic and social systems, and which will encourage technological pluralism.

Technology is one of the principal levers which will make it possible for us to meet the *challenges of the future*, and to ease any necessary changes of lifestyles. But we should not forget the certain risks in some technologies, which we should face now. To hold back technological change would deprive us of its very necessary benefits.

The following table sets out a synthesis of some of the diagnostic factors for Europe (strengths, weaknesses, objectives, priority actions).

¹ By analogy with the 'information society', the 'cash-less society'.

Summary diagnosis

<i>Strengths (examples)</i>	<i>Weaknesses (examples)</i>
<ul style="list-style-type: none"> → Cultural héritage and diversity → Technological and human capital → Commercial and monetary power → Market with 260 million consumers → Privileged relationships with the Third World → Agricultura! potentia! 	<ul style="list-style-type: none"> — Dependence on energy and raw materials — Demography — European security — Technological dependence — Absence of Europe-wide industry — Absence of a consensus on the type of society — Régional and social inequalities — Political instability and heterogeneity of certain countries — Rules of Community décisions
<i>Commun'uy objectives (examples)</i>	
<ul style="list-style-type: none"> — Economic growth, employment — Meeting social aspirations (security, heakh, éducation, etc.) — Independence (économie and military security) — Cohésion and reinforcemem between the member countries — Control of choices and of development 	
<i>Priority actions (examples)</i>	
<ul style="list-style-type: none"> — Restructuring of the productive apparatus — Concentration of industries on a European scafe (automobile) — Industriel coopération (aerospace, télécommunications) — Aid to régions and sectors in difficulties — Coopération with the Third World — Social research (on tomorrow's aspirations and unemployment) — Technologica! research and development — Study of the impact of technologica] projects — European programming (agriculture, population, public finances, health, éducation, structure of consumption) 	

Methodological annex: Définitions and concepts

When facing the future, a necessarily subjective personal judgement is often an essential filter, if not, indeed, the only élément of information which is accessible. This subjectivity, however, does not in any way affect the 'scientific' validity of the hypothèses and reasonings which are advanced, provided, at least, **that** the assumptions, values and référence Systems of the authors are made as explicit as possible.

This is the object of this annex on définitions and concepts. Our concern is to point out first why the mission of FAST is, above ail, a '*prospective*' one. We should distinguish between '*prospective*' and '*forecasting*' studies, and make clear the principal bases of '*prospective*' studies, together with the logical *conséquences* which result. We will then specify one other concept of our référence grid: *future problems*.

Part 1. Forecasting - Assessment - Prospective

1.1. Forecasting: why is it necessary?

The accélération of the rate of change contributes to uncertainty about the future, and so makes forecasting necessary to guide our présent actions. But what good is it to anticipate future problems when we are already saddled with enough in the présent? Precisely because the problems of today are the result of yesterday's failures in forecasting.

In récent years, we hâve been confronted with a séries of monetary, energy and économie crises. Each time it was necessary to wait until the crisis became a major one before action was taken. In some cases we still await a response. The accélération of technological, social, political and économie change makes future disturbances increasingly probable¹ and increasingly close to us. The only alternative, and this is precisely one of the essential missions of the FAST programme, is to list the promising opportunities and to identify the problems before they become critical. Only then can the appropriate R&D actions be undertaken in time.

This alternative is of course full of pitfalls. One can no longer rely on studies of the future, nor on the many forecasting errors which result from them. Without claiming to carry out an n" prospective investigation of the future world, it is nevertheless necessary to pose questions concerning the future. Not to consider the future is one, more risky, way of mortgaging it. Gaston Berger has very reasonably pointed out that 'the faster a car moves the farther the headlights must reach'.

¹ Only the nature and the conséquences of these disturbances remain largely uncertain.

1.2. FAST: A prospective mission

The FAST programme is not, in the classical sense, one of forecasting evaluation, but employs a prospective approach which is less deterministic. We recognize that the future is not yet cast; it remains to be cast by the implementation of the wishes of the actors and the 'force relationships' between them. The prospective concept is already well established in France, Italy, Spain and South America, and is beginning to appear within quotes in specialized publications.¹ In what way does the prospective approach differ from the forecasting approach?

Part 2. The principles of prospective research

What is the good of reflecting on the future if it is already written in advance? In our opinion this question is not a fair one. Apart from certain determinisms, the future remains largely free and open. This postulate of freedom, of history written by man (but, alas, often at the expense of others) conditions most of the constituent elements of our reading grid which are termed, perhaps still strangely, *projects, desires, actors* and the more familiar ones of (*rends, constraints, mechanisms and déterminants*, without overlooking the more disturbing concepts such as *problems, changes, crises and ruptures*. The origin of this grid lies in a fundamental hypothesis which must now be introduced: the contradiction between forecasting — which assumes a certain determinism — and action, which implies freedom, is only an apparent one.

2.1. The future is not written; it has still to be built²

Prospective studies were born of an understanding of a future which is both the domain of determinism and of freedom. If human action forges history, what is determined results from the crystallized actions of the past which lead to a given evolution in the productive forces.³ This evolution, even if it is imposed on us, does not generally imply a unique transformation of social and productive relationships but opens up a range of possible futures, a field of freedom for human action.

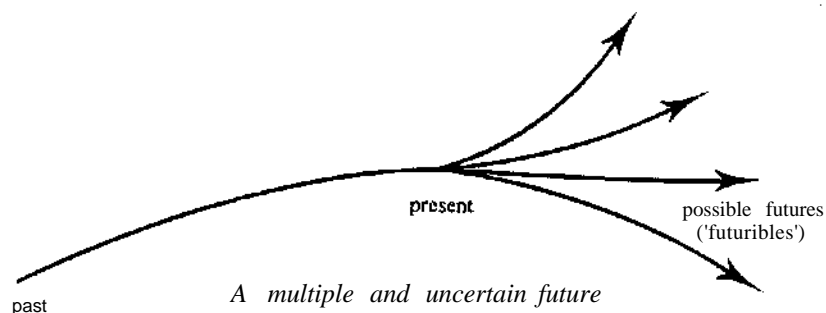
¹ As can be seen from the translation of the title '*Crise de la prévision et essor de la prospective*' (PUF 1977) into '*Crisis in Forecasting and Emergence of the "Prospective" Approach*', Michel Godet, Pergamon 1979, a work which should be referred to for a more detailed examination of the characteristics of the prospective approach and its methods.

² Most of the developments of this paragraph are based on former reflections, see *Crise de la prévision et essor de la prospective*.

³ Productive forces are not only material but also spiritual. See Marx, *Outlines*.

From this viewpoint there is no determinism except in the sensé that a given évolution of the productive forces resulting from past actions presents one particular range of possible futures and not another range. Man, insofar as he has not committed and mortgaged his future (an almost closed range) retains many degrees of freedom from which he can profit in order to promote one or other possible future which he regards as more désirable in relation to his own project.

So the future should not be envisaged as a unique and predetermined line, or as a prolongation of the past:¹ the future is multiple and uncertain. The plurality of the future and the degrees of freedom for human action go hand in hand; the future is not written; it remains to be built.



Finally, therefore, the only determinism which we recognize in the past are the greater or lesser degrees of freedom which man has, as a result of his past action, to act in the présent in the light of his future projects. What is *suffered* in the future results from *past actions*: what is *willed* explains *présent actions*.² Now, there is no will without an object, and the object of the will is precisely that the désire should be realized. Projects are sustained by the lack of something, or the perceived lack of something, in other words by a divergence between the présent or anticipated reality and needs and aspirations, and clearly the latter have no boundaries and are extendable.

By rehabilitating will as a force which produces the future, it becomes easier to understand why political, économie and social structures break down as soon as certain types of constraints contradict this will, and become intolérable. *The problems of the future* come into being when the gap between the reality and aspirations becomes too wide.

¹ The past and the présent are irréversible, unique and certain, but the knowledge we have of them is incomplète; even if the facts of the past are certain, they are only a tiny part of the unknown number of phenomena that make up reality. In conséquence history is only a bet on one of many interprétations (the fact is unique, its interprétations are multiple). It is in this sensé that we can say that there are several pasts, or rather several approximations to the same past which one never totally knows.

² It is interesting to note that in English the verbal form of the future is shown by the auxiliary 'will', a verb which indicates désire. The future is the intention, the project, the désire.

2.2. Multiple futures and the rôle of actors

The plurality of possible futures arises from interactions between the forces of the past, présent constraints of a techno-economic, socio-cultural and political order, and the deliberate actions of man. On the subject of the former some have spoken of the *imperialism of the past*,¹

The force relationships between various countries, territorial communities and social groups, generally termed the actors,² are unequal. Some have more power than the others (a) to *block* in a future which is regarded as unacceptable, or conversely (b) to *stimulate development* of the possible futures which they consider to be the most desirable.

Writing in 1963 Jean Meynaud suggested that 'spéculations on the future largely constitute an essay in persuasion of the benefits of the existing social order'.³ In other words, the actors who support and represent the existing social order have a higher probability of seeing the futures which they desire come to fruition. In a world which is unequal and confrontational, *the future is only the result of the confrontation of unequal human forces*, 'corrected' by the main trends and the constraints. The future does not belong to everyone in the same way and to the same degree. Some actors have a greater influence on it than others.

2.3. For the actors the future is the 'raison d'être' of the présent

Societies are most frequently in a state of transition when the old equilibrium of forces has disappeared, but when the new equilibrium is not yet born or stable, it is necessary to look to the future to clarify the présent, so that 'the future is the *raison d'être* of the présent'. 'Prospective' is an anticipated retrospective; one understands better today what happened in 1960; in order to understand what is happening today it is necessary to locate oneself in 1990 or beyond.

The image of the future is also printed in the présent. For example, the consumption of an individual at any given moment does not depend solely on his previous income (saving) but also on the future income which he anticipates (credit), as Milton Friedman clarified so effectively in his permanent income hypothesis.

The image of the future is not solely speculative; it is, in particular, normative and results as much from projects as from constraints.

¹ In the phrase of August Comte: 'The dead govern the living'.

² Actors: that is to say those who play an important rôle in the Systems studied through the variables which characterize their projects and which they more or less control. Example: consumer countries, producer countries and multinational companies are all actors in the energy System.

³ Jean Meynaud, 'Concerning spéculations on the future', *Revue Française de Science Politique*, No 3, September 1963.

On that basis, and if several futures are possible, the one which will in fact be produced is born as much from the confrontations of the projects of the actors and the force relationships as from the évolution of trends. The various actors présent in a System often hâve contradictory projects and préférences which correspond to différent possible futures. The future must be considered as the result of these différent forces. In order to identify what are the most probable results it is necessary to understand fully the projects and intentions of the actors, their methods of action on one another, coupled with the constraints on them.

For example the rate of development of 'telematics' is not an autonomous movement; it dépends mainly on the desires of governments, on the projects of companies and on the reactions of users.'

Part 3. New ways of looking at futures

3.1. The need for an overall view

Sectional forecasting only retains a few explanatory variables generally of the économie and quantified type. It does not take into account the development of force relationships and the appearance of new trends, so it is more deceptive than valuable. This failure to forecast arises from the fact that the economy is regarded as an autonomous sector, so that économie forecasting is divorced from social and political forecasting and is itself fragmented into technological, démographie and other forecasts.

Each discipline becomes autonomous; in particular technoiogicaï forecasting too often regards the development of the sciences as the 'cause of causes', i.e. as déterminant and not determined. However, as évolution accélérâtes so interdependence is reinforced. Everything acts on everything else. Nothing is in any respect equal. An overall vision is necessary.

3.2. The limits of quantification

The impossibility of forecasting the future as a function solely of past data explains the weakness of classical econometric models which do not integrate qualitative and non-quantifiable parameters such as the projects

¹ During a récent prospective survey by SEMA on the development of (clematics in France, it was surprising to find that the manufacturées of electronic equipment beïeved in telematics less than the French administration, the latter being undoubtedly influencée! by the findings of the Nora-Minc report on the growth of the information society (Doc. Française 1978).

and behaviour of the actors. In passing, it should be emphasized that the dangers of false quantification — to quantify must involve giving priority to what is quantifiable at the expense of what is not — should not lead to the total rejection of figures. But we should use them with extrême caution, especially since statistics are flawed by errors. As O. Morgenstern emphasizes: 'The national income and consumers' purchasing power probably cannot be known without an error of between $\pm 10\%$ and $\pm 15\%$.' According to this author it is to be regretted that statistics are published without an estimate of the observational error which may have been involved.

3.3. The absence of a unique model of évolution

The multiplicity of possible futures is of crucial importance, since it is opposed to the concept of a linear unwinding of time and to laws which assume the fundamental uniqueness of one model of modernization, or of one évolution of the contemporary industrial world. According to the American futurologist Daniel Bell, one view can be summed up as: 'what the rich do today the poor will do tomorrow'. Rather than accept these determinist interpretations of history, whether Libéral or Marxist, which assume a single evolutionary model tending towards a final 'idéal' phase, we prefer the prospective philosophy which leaves room for a variety of possible évolutions.

3.4. The plurality of temporal horizons

To accept that the future is multiple, and that there is no unique model for évolution, is also implicitly to acknowledge that the horizons of 'prospective' are to be viewed in the plural. The horizon of 'prospective' is that of possible structural changes, résistances and discontinuities. The accélération of change, coupled with the variety of Systems studied, leads to accepting a range of différent time scales, or 'temporal horizons'.

From this point of view, the concepts of short, médium and long term do not have any sense except as a function of the problem being studied. The horizon of 'prospective' is not that of the absolute temporal long term of which one most frequently dreams, but that of the long term in the sense where 'long term' is when many things may have changed. From this prospective standpoint, the horizon of FAST is that of *changes in the structure*, whether these are near or far in a strictly time sense.

¹ O. Morgenstern in *Accuracy and uncertainty in economic data*, Dunod 1972, p. 8.

3.5. The limits of 'prospective'

First, there is no neutrality in 'prospective', Any prospective approach requires choices between basic hypothèses, and the result is impregnated with a System of values, an ideology, implicit and explicit. It is only valid insofar as this system is itself acceptable to the reader or the user.

Normally, 'prospective' should give full *rein to the imagination*. In practice, to imagine and to construct a pathway towards a better future, to assume that this project is in no way impossible, necessarily leads to mobilizing all the forces possible to bring this project to fruition. The *announcement effect* is another limit -- publication of the *évolution* which one expects, whether founded or not, may by its very diffusion, result in reactions which will then influence this *évolution*. This announcement effect can be harmful when it contributes to stoking inflation, or to a fall in investments in relation to the lack of confidence in recovery, but it possesses *bénéficiat* virtues when it highlights the risks of the future so as to *prépare* for the m or to avoid them more effectively.

The future is a *land* which is emerging, but with unknown contours. The constraint is that, despite these unknowns, it is necessary today to take *décisions* which commit us in the future. // *is necessary to gamble, without, however, mortgaging the future since it is increasingly changing and uncertain,*

We should also emphasize that the object of 'prospective' is to guide our *présent* actions in such a way as to enlarge the field of what is realizable tomorrow. In short, to keep our options open. In particular, 'prospective' should lead to the better weighing-up of *décisions* which, by their irreversible effects, could compromise the future or at least reduce our future freedom. For this reason, the true criterion for a political *décision* is to avoid the rigidities of structures by seeking the maximum flexibility and adaptability in the face of the uncertainties of the future.

Part 4. The future problems

A future problem arises from the divorce between prospects and aspirations, that is to say to a gap between the probable future situations and the desired futures. Perception and *définition* of the future problem are, at the *présent* time, subjective *opérations*, since the desired future or futures can vary considerably from one actor to another.

In the *spécific* case of FAST, we must make as *précise* as possible the images of the future desired by and for the European Community, if they

exist in an explicit manner (which does not, at a first glance, seem to be the case).

In the light of the objectives of FAST the first European future problem is the future of the European Community itself. What will it be in fifteen-twenty-three years? Political economists and specialists in international relations generally see only a problem of transition and a struggle between national sovereignty which is to be 'effaced' and 'European' sovereignty (fédéral, passing through a 'confédéral' phase) which is still to be established, and all according to the logic of a linear and irréversible process which advances from the 'national' to the 'supra-national/federal'.

A question arises from this latter viewpoint: how many of the travellers will have embarked in the European boat? Between now and 1985, there may be 12. But can we be sure that there will still be 12 in 1990, or in the year 2000? There could be 15 or 18; similarly there could be 10 or even less.

Another question: what will be the relations between Community Europe and Eastern Europe? Can we limit ourselves to the hypothesis of a *status quo* or some marginal changes?

Finally, therefore, one can put forward as the framework of an operational analysis, a distinction between *three catégories* of problems:

- *Community problems*: those where the causes, manifestations, effects and solutions are of a Community nature and dimension (examples: migration, régional imbalances, agricultural development, organization of markets, transport Systems, etc.).
- *problems common to all the member societies of the Community*, but which are not however 'Community' in their causes (ageing of the population, high energy dependence on the outside world, organization and management of the public sector, information, télécommunications, defence and military technology Systems).
- *problems common to all highly industrialized societies in the Western world* which are, by définition, transnational in their causes, manifestations and effects (examples: the impact of microprocessors, changes in the relation between production factors, new attitudes in regard to 'productive work', the development of an informal economy, cultural homogenization, économie specialization and competitiveness, and the solution of social conflicts).

Abbreviations and acronyms

ACP countries	African, Caribbean and Pacific countries
ASEAN	Association of South-East Asian Nations
BIS	Bank for International Settlements
CAP	Common Agricultural Policy
CEPII	Centre d'études prospectives et d'informations internationales
CERD	European Research and Development Committee
CIA	Central Intelligence Agency
CIPEC	Intergovernmental Council of Copper Exporting Countries
Comecon	Council for Mutual Economic Assistance
DC	Developing countries
DMEC	Developed market-economy countries
EAGGF	European Agricultural Guidance and Guarantee Fund
ECSC	European Coal and Steel Community
EEC	European Economic Community
EMS	European Monetary System
ESIST	European Society and its Interactions with Science and Technology
EUA (ECU)	European unit of account (European currency unit)
EURATOM	European Atomic Energy Community
FAST	Forecasting and assessment in the field of science and technology
FUTURIBLES	International Prospective Association which publishes the journal of the same name
GATT	General Agreement on Tariffs and Trade
GDP or GNP	Gross domestic product
GNP	Gross national product
GPS	Generalized Preference System
IBA	International Bauxite Association
IDL	International division of labour
IEJE	Institut économique et juridique de l'énergie (Grenoble)
IIASA	International Institute for Applied Systems Analysis (Vienna, Austria)
IMF	International Monetary Fund
INSEE	Institut national de la statistique et des études économiques (France)
Interfuturs	International Prospective Research Project carried out at OECD in 1976-79 under the leadership of Professor J. Lesourne
LDC	Lesser-developed countries
MIC	Market-industrialized countries
MIT	Massachusetts Institute of Technology
MNC	Multinational corporations
NATO	North Atlantic Treaty Organization
NIEC	New international economic order
OECD	Organization for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
PEC	Planned-economy countries
PVD	'Pays en voie de développement'
PUK	Péchiney - Ugines - Kuhlmann
R&D	Research and development
SDR	Special drawing rights
Sema	Consultant engineering firm
Stabex	Stabilization of export earnings
ST	Scientific and technological
Toe	Tonne oil equivalent
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
USSR	Union of Soviet Socialist Republics

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Challenges to Europe in a hostile world

by *Michel Gode!* and *Olivier Ritysseii*

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Looking to tomorrow for the action needed today — that is the approach followed by the report *The Old World and the new technologies* in reviewing the crises and issues facing Europe in the économie, energy, industrial and socio-political arenas.

The growing différences between European countries and mounting international uncertainty could in time shake the foundations of the Community. Will Europe's strengths triumph over its weaknesses? On this will dépend the décline or résurgence of the old world.

The technological révolutions now under way (in microelectronics, biology and other fields) herald a new era of increasing efficiency and are bound to disrupt completely existing production structures (through automation, decentralization, etc.) and consumption patterns (e.g. new products).

As a result, the appropriate development of technology will be one of the main ways of meeting the challenges of the future. Technological development will be a crucial comparative advantage that Europe must hâve if it is to détermine its own future and pave the way for the necessary changes in our way of life and socio-economic order.

The Old World and the new technologies is one of the first products of an EEC Commission think tank known as FAST (Forecasting and Assessment in the field of Science and Technology). The main task of the FAST programme (run by the Directorate-General for Research, Science and Education) is to identify future problems in the Community in order to guide spending on research and technological development.

The FAST team was sst up in 1979 and consists of six research scientists, including the authors of this report, Dr Michel Godet and Dr Olivier Ruysen.

Michel Godet, Doctor in Economies and in Science is the author of *The crisis in Forecasting and the Emergence of the 'Prospective' Approach*, Pergamon 1979, and of *Creative crises*, Hachette 1980.

Olivier Ruysen, a qualified engineer and a Doctor in Economies, is co-author with Michel Godet of *Les échanges internationaux*, PUF 1978.

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