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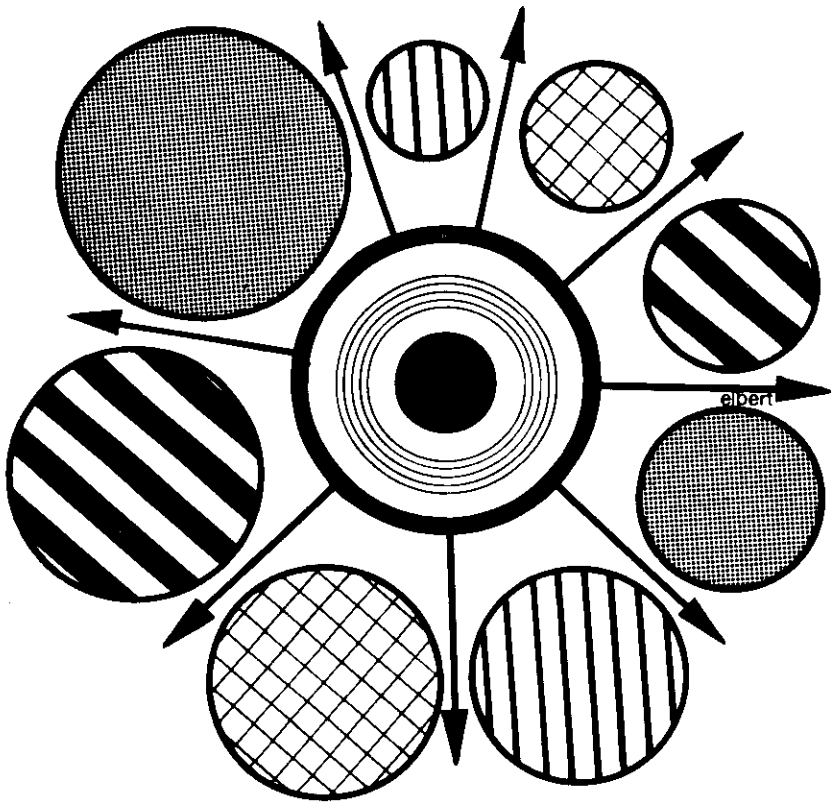

MOBILISING THE INDIGENOUS POTENTIAL OF DISADVANTAGED REGIONS

A NEW DIMENSION OF REGIONAL PLANNING

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MOBILISING THE INDIGENOUS POTENTIAL OF DISADVANTAGED REGIONS

A NEW DIMENSION OF REGIONAL PLANNING

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PRELIMINARY NOTE

This study has been drawn up by Mr Jacques ROBERT (Director of Studies, RESEAU, International Co-ordination, The Hague) at the request of the Council of Europe Secretariat in application of the 1981 programme of intergovernmental activities (Activity 16.1.2: The concept of balanced regional development).

The author is responsible for the opinions expressed in the text; they do not necessarily reflect the views of the Council of Europe.

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Summary

The industrial transformation which, for a variety of reasons, has intensified in European countries since the mid-1970s has accelerated the growth of regional inequalities. The difference in potential between the most developed and the least developed regions, reflecting differences in both economic level and capacity for development, has widened steadily over the past 15 years. Many peripheral and disadvantaged regions, whether rural or coastal, after being poorly industrialised during the years of fast growth, have become "second-generation reconversion zones".

Under present conditions, it has become virtually impossible to raise these regions' potential by exogenous means, ie by transferring productive activities from central regions, because the factors of production have become considerably less mobile as the crisis has deepened. Potential increase is conditional on developing the regions' own resources, both material and human. Methods for mobilising the indigenous potential of disadvantaged regions include modernising the technologies used in industry, especially in independent small and medium-sized firms, providing the workforce with better vocational training, increasing the profitability of agricultural industries, developing rural tourism and exploiting renewable sources of energy. To take effect, these measures require a new form of physical planning, more broadly based and closer to the grassroots, which should involve integrated local development schemes aimed at developing all mobilisable resources and encouraging the synergy on which the revival of these regions depends.

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1. REGIONAL PROBLEMS IN EUROPE IN THE 1980s

1.1 The main stages of spatial development in Europe since the war

Spatial development in European regions since the war can be divided into three main stages, which share a broad common denominator despite slight variations from country to country:

i. Concentrated spatial development from the end of the war to the early 1960s

Growth during this period mainly assisted industrialisation around large cities, the birthplaces of technical progress and technological innovation. Firms sought both economies of scale and external economies. They were not hampered by urban congestion problems or labour costs, which remained low. Regions tended to specialise in one or more industrial sectors.

ii. Deconcentration of industry from the early 1960s to the onset of the economic crisis in 1974

Innovation spread along the major trunk routes. Firms organised themselves to take advantage of labour cost differences between the various regions. Spatial deconcentration of production was coupled with heavy sectoral concentration in the various branches as small and medium-sized regional firms were taken over by big national and multinational groups. With the introduction of an inter-regional division of labour based on skill levels, a hierarchical system of production, management and research activities took shape and gradually replaced regional industrial specialisation. Industrialisation penetrated by degrees into agricultural regions with rural-type economies. This pattern of development made it possible to absorb part of the workforce freed by productivity increases in the agricultural sector - which simply meant transferring a poorly skilled workforce from one sector to another. Skill levels made no significant progress, and the jobs offered even became relatively less skilled as mergers led to the gradual transfer of medium and high-level activities in regional firms towards large cities and national capitals. Deconcentration was entirely selective, so that high-level activities continued to flourish and expand in or around large cities. Long-distance decentralisation in this respect was minimal.

iii. Reconcentration since the beginning of the economic crisis

Many factors account for the stepping up of industrial redeployment in European countries since the mid-1970s, not all of them linked to the oil crisis. Industrialisation in the third world has increased competition for the products of labour-intensive and first-stage processing industries as well as low-value-added products. Trade agreements concluded between the EEC and other countries (ACP, Mediterranean and Latin American countries, Generalised Preference System) tend to ease trade restrictions, which heightens competition in some products, but also enables European countries to increase their exports of industrial products, capital goods, technology and so on. A second series of factors forcing European countries to reorganise their production systems is technological competition from the United States and Japan. The rise of oligopolies from these countries follows the emergence of new economies of scale involving production unit size and marketing techniques. In the first

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group, concentration mainly affects high technology sectors whose turnover includes a high proportion of research and development costs (eg information technology, the aircraft industry), but also sectors using more standard technology (eg the steel, petrochemical and car industries) where economies of scale are needed to recoup the costs of mechanising and automating production processes.

Marketing techniques are also steadily gaining in importance. It is vital for large groups to possess a worldwide sales network. Faced with this technological challenge, European countries have given top priority to technological development, which is a further - and major - reason for reorganising their production systems. The third factor behind industrial redeployment is Europe's oil and raw material dependence. The sharp rise in oil prices in 1973 and 1979 led to a substantial transfer of funds from the industrialised countries to the oil-producing countries, tantamount to a sudden rise in production costs. This has compelled firms to alter their structures in order to maintain their profit margins, which explains the large scale of investment in rationalisation and automation. Mounting energy costs have also affected transport costs, and consequently industrial location. The combination of these developments during the third period has had important spatial repercussions:

- a sharp drop in industrial employment and decentralisation to the detriment of disadvantaged regions;

- the development of new activities with high levels of technological input in heavily industrialised and built-up regions - especially research and development activities in the tertiary and quaternary sectors;

- as a result, a distinct aggravation of regional inequalities in Europe since the onset of the economic crisis. The Commission of the European Communities recently noted in its "First periodic report on the social and economic situation of the regions of the Community" that after a slight reduction during the 1960s, regional disparities of GDP/head for the community valued at current prices and exchange rates, had risen considerably during the 1970s. For example the GDP/head ratio for the ten strongest versus the ten weakest regions had risen from 2.9 to 1 in 1970 to 4 to 1 in 1977, and other dispersion indicators yielded similar results (1).

1.2 Regional problems arising from the new situation

Some twenty years ago, when oil replaced coal as the basic source of energy and European ores were supplanted by overseas imports, the "first generation" industrial reconversion zones appeared. The energy crisis and the evolution of international economic relations from 1974 onwards have

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(1) Unofficial translation

produced "second-generation" reconversion zones. Unlike those of the first generation (mining areas in northern France, Lorraine, Wallonia, Limburg, the Midlands and the Ruhr), the second-generation zones cover huge areas. They were poorly industrialised during the period of fast economic growth (low-technology production lines requiring relatively unskilled labour, assembly plants, first-stage processing of raw materials, etc) and are often rural or semi-rural peripheral regions, though some lie in the heart of Europe. They also include coastal regions specialising in types of production which are facing more and more competition from newly industrialised countries (eg petrochemical, coastal steel and shipbuilding industries). Firms in these areas are forced to relocate non-competitive plants in third world countries as the only alternative to closing down production. Massive transfers have already taken place in labour-intensive industries (eg textiles, consumer electronics, car assembly) many of them within transnational companies.

The other aspect of the reconversion of these regions is the automation of production. A considerable proportion of industrial investment over the past few years has gone into rationalisation and automation, mainly to increase productivity, and the impact on employment has been disastrous.

The economic reconversion of second-generation zones is much more complex than that of first-generation zones because of the overall slow-down in growth, the general decline of industrial employment, the very low level of company mobility and the locational restrictions on growth activities. Growth sectors mainly benefit central regions which already have sizeable industrial and service infrastructures, highly skilled workforces and substantial capital resources. Second-generation reconversion zones are consequently facing serious unemployment problems (due to the fairly fast rate of population growth still prevailing in many of them and the large numbers of young job-seekers regularly arriving on the labour market), the rapid disintegration of their industrial fabric and the automation of industrial production, which is likely to spread to the tertiary sector (non-automated tertiary activities being a marked feature of such regions).

2. THE DIFFERENT CONCEPTS OF REGIONAL POTENTIAL

The concept of regional economic potential, despite renewed interest in it over the last few years, remains ambiguous. It refers both to the level of development reached by a region (in which case it may be likened to a threshold or a profile) and to its capacity to develop further (in which case it means the wealth that could be created if unexploited or underexploited regional resources were developed).

The concept of potential is also a dynamic one. As J Paelinck points out, any decision (taken by private or public economic units) will, once it has been carried out, alter the profile of a region and affect the decisions to be taken in the future. If the change tends to increase potential, all the better; if potential deteriorates, the region is liable to slide gradually towards a very low potential, a state of affairs which enlightened local authorities would no doubt prefer to avoid. These positive and negative dynamics exist, and the whole of regional policy may be defined as a permanent attempt to correct regional potentials (1).

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(1) J Paelinck, "Une théorie des seuils de croissance régionaux". Colloquy on "Seuils d'efficacité de la planification et de l'action régionale", Mons, November 1977.

2.1 Quantification and evolution of the potential of European regions

Though the concept of regional economic potential has never been incorporated into an exact doctrine or linked to a theory of regional development, several attempts have been made to describe it in quantitative terms. The most recent of these, which is especially relevant here since it covers all the EEC member regions, was made by the Geography Department of the University of Cambridge at the request of the Commission of the European Communities (1).

The study sets out to measure the potential of European regions and its evolution. As in the prior work of the economists Harris, Clark and Rich, the concept of potential proposed here relates specifically and solely to a region's relative accessibility (or nearness) in geographic space to economic activity as that is actually located within a wider area (in this case the EEC). According to this definition, a region's potential is the sum of relations between the volume of economic activity of each of the EEC regions and its distance from the region in question. The definition is expressed as follows:

$$Pi = \sum_{j=i}^{n} \frac{Mj}{Dij}$$

where:

Pi = economic potential of region i

Mj = measure of the volume of economic activity in region j (in fact it is Gross Domestic Product of the region)

Dij = measure of the distance between region i and region j

This calculation is primarily intended to provide an objective measurement of a region's centrality or peripherality in relation to economic activities as they are geographically distributed over the European continent: the higher the potential value, the more central the region. Though the authors stress that the potential obtained in no way involves a prediction of the region's capacity to develop further (internal developemnt reserves), they nevertheless admit that it may also be taken to reflect the region's comparative advantage in terms of economic development. The evolution of the potential value over a given period reflects that of the region's relative accessibility to European economic activities (proximity of markets, suppliers, sub-contractors etc).

Here is a brief reveiw of the study's findings:

In 1977 the regions with the highest potential were, overall, the most geographically central ones - Rhineland-Palatinate-Hessen (9664), Karlsruhe (8529), Düsseldorf (8082), Ile-de-France (7346), southern Holland (6389), Belgian Brabant (6349) and Antwerp (6162). Those with the lowest potential were the geographically peripheral ones: Calabria (1134), Basilicata (1369), Sardinia (1350), Corsica (1634), Ireland (1686) and Scotland (1954). The

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(1) D Keeble, P L Owens, C Thomson, "Centrality, Peripherality and EEC Regional Development Study". Department of Geography, University of Cambridge. Draft final report 1981.

gap between the potential values obtained is striking: the potential of Calabria amounts to only 12% of that of Rhineland-Palatinate-Hessen. Ten other regions (including seven in Italy) have potentials below 20% of the previous maximum, whereas twelve others have potentials exceeding 60% of the maximum. If potential reflects comparative advantage in terms of economic development, the potential of peripheral regions must be expected to evolve in a less favourable direction than that of central regions. And that is indeed what emerges from the study. Throughout the period analysed (1965-77), but especially during the late 1960s and early 1970s, inequalities in potential between central and peripheral regions grew more and more marked. Between 1973 and 1977 the potential of Rhineland-Palatinate-Hessen increased by 3632 units, that of Düsseldorf by 3037 units, that of the Ile-de-France by 2777 units and that of Brabant by 2656 units, while that of Calabria increased by only 423 units, that of Puglie by 566 units, that of Ireland by 636 units, that of Scotland by 733 units, that of the midi-Pyrénées by 783 units and that of Brittany by 1050 units. The potential of peripheral European regions has thus dropped in relative terms as European integration advances, and this despite the implementation of regional policy measures.

2.2 Patterns of evolution of regional potential

A region may increase its potential in two different ways:

- the exogenous mode, in which the factors of production (capital and labour) move from outside into the region in question. This pattern is mainly a feature of fast-growth periods in which the factors are very mobile. It contributed substantially to regional development until about 1973 (accumulation of factors of production in the central regions, centripetal migration trends, foreign investment, but also trends involving selective decentralisation towards the periphery, often backed up by regional policy measures). A high potential is then a source of attraction for external economic units. As J Paelinck notes, it is not unreasonable to expect economic and social units to move towards places whose overall potential they consider to be higher than that of the place in which they are currently situated (1).

- the indigenous mode, which entails mobilising and developing unexploited or under-exploited internal resources, substituting regional products for the region's imports and strengthening the region's export capacity. This pattern prevails in periods when the factors of production are not very mobile, as at present. According to R Wettmann (2), the indigenous increase of potential (or "development of indigenous potential") derives from such factors as "the physical and environmental resources, the genius and energy of people, the urban structure, the accumulated man-made capital etc". To clarify this somewhat general definition, Wettmann notes that "in view of the present macroeconomic conditions, the term can be defined in a narrower sense as regional innovation potential. The regional innovation potential, which under present conditions represents the decisive bottleneck factor of regional development, might become an

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(1) J Paelinck, "Une théorie des seuils de croissance régionaux", /op. cit./

(2) R Wettmann, E Ciciotti, "The mobilisation of indigenous potential", CEE 1981

important leverage point for regional policies. The innovation and adaptation potential of a region is defined as the network of those economic activities and functions of individual firms and their environment which determine the speed and scope of technical and organisational modernisation and the ability of the firms within the region to compensate for the loss of old markets by the opening up of new market potentials". This definition tallies with that of R Abt: "Given the current situation, the capacity to develop is essentially becoming a capacity to reorganise. (Indigenous) potential can be taken to mean capacity for technical, organisational and marketing innovation." (1) However, an excessively restrictive view should be avoided. While potential increase in disadvantaged regions is largely a matter of innovation in small and medium-sized firms, other resources can also be mobilised and stimulated (eg renewable energies, agricultural resources, rural tourism, craft industries, human resources through vocational training). At the present time, exogenous increase of potential is only possible in highly central or exceptionally attractive regions, which are the only ones still able to tap highly skilled personnel (through a boost in demand) or external capital (especially through national savings). They also have a considerable capacity for indigenous potential increase thanks to the innovation agents in their possession. The regions referred to in Chapter 1 as "second-generation reconversion" must mainly seek to increase their potential by indigenous means, which does not rule out exogenous contributions in certain cases.

3. MAIN POINTS OF A POLICY OF INDIGENOUS PROMOTION OF REGIONAL POTENTIAL

3.1 Potential analysis

Since the very concept of potential is ambiguous, analysing it is a many-sided process:

- Measuring potential

This is mainly designed to bring out differences in potential between various regions and variations in the potential of a given region over a period of time. The University of Cambridge exercise in quantifying the potential of European regions, quoted in Chapter 2, comes under this heading. Nevertheless, a model-based approach of this kind inevitably has a reducing effect. Many other factors besides gross domestic product and distances between regions could be taken into account in measuring potential. The regions' diversity is evidence of the highly specific factors behind their potential, which it is helpful to identify. Consequently, working out a point of comparison designed to reflect the various regions' potential necessarily involves simplification.

- Identifying elements that can be stimulated to increase regional potential

Depending on whether potential is to be increased by exogenous or indigenous means, different factors normally have to be taken into account, though some can serve both strategies (eg transport infrastructures). Promoting

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(1) R Abt: "Praxisorientierte Potentialbestimmung für nichttouristische Entwicklung in Bergregionen". Arbeitsberichte NFP "Regionalprobleme in der Schweiz", Bern 1981.

potential by exogenous means entails identifying the factors likely to increase the region's attraction for external economic and social units (eg accessibility, technical and socio-cultural facilities, housing), while promoting potential by indigenous means entails identifying the areas containing resource reserves (eg natural resources, skill level of the workforce, technical level of regional firms, available capital). The table below, which does not claim to be exhaustive, lists the factors to be taken into consideration for such an analysis, distinguishing between the indigenous and exogenous methods of development.

- Evaluating unexploited or underexploited production reserves

This should logically follow the identification of elements amenable to stimulation. The idea is to express in terms of production, jobs, possible exports and so on, the maximum volume of wealth that can be created by mobilising unexploited or underexploited resources while maintaining the necessary balance in vital areas such as ecology. It in fact amounts to evaluating the maximum increase in potential that might realistically be expected given optimal exploitation of all available resources.

- Working out a diagnosis and a strategy

From the operational point of view, identifying the elements amenable to stimulation and evaluating production reserves present decision-makers with a number of choices, given that all the available resources cannot, for obvious reasons, be mobilised simultaneously. Potential analysis must therefore highlight the major bottlenecks restricting the development of the region concerned and indicate by what means and at what cost its potential reserves can be mobilised.

Potential analysis is not a forecast: even at a time of economic crisis, it is based on a possible improvement of supply. Moreover, being directed not only at the regional authorities but also, and perhaps primarily, at the region's economic and social units, it must serve as the starting point of a synergistic process involving the greatest possible number of local and regional initiatives. This requires it to consist of qualitative and detailed elements, rather than global quantified ones. As R Abt puts it, "potential analysis should be a practical scenario for development, possibly offering several variants" (1).

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(1) R Abt: "Praxisorientierte Potentialbestimmung für nichttouristische Entwicklung in Bergregionen" op. cit.

Potential Indicators

For exogenous development	For indigenous development
. Natural and environmental conditions: natural factors of attraction for outside investors and agencies (eg landscape, water, wind, climate, pollution levels)	. Natural and environmental conditions: natural resources for indigenous exploitation (raw materials, vegetation, renewable sources of energy), quality of landscape and environment
. Workforce: relative cost, availability, training and skill levels	. Workforce: training and skill levels, professional experience motivation and attitudes towards innovation in industry
. Macro-spatial locational aspects: inter-regional accessibility, major transport and tele-communication infrastructures	. Accessibility of outside markets and high-level services: transport and telecommunication infrastructures
. Micro-spatial locational aspects: industrial zones, land prices, available housing capacity, environmental standards	. Firms: sectoral specialisation of production, technological level, size, financial situation, degree of external dependence in decision-making, marketing network, internal organisation of production, management attitudes towards modernisation and innovation, degree of inter-firm co-operation and co-operative spirit
. Availability of external economies and high-level facilities (large cities)	. Craft industry: relative size, quality of products, sales arrangements, co-operative spirit
. Level of local taxation	. Tourism: resources, number of visitors, development capacity (especially rural tourism)
. Financing possibilities for setting up and expanding firms	. Access to risk capital: availability of specialised banks, banks' attitudes towards innovation
. Social climate	. Inductive tertiary activities: services to firms and vocational training (categories, level of development, accessibility)
. Residential attraction (fostering immigration)	

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- Agriculture: soil conditions, structure of farms, average age of farmers, technical level of farms

- Residential attraction restraining emigration: educational and socio-cultural facilities, housing, quality of life

- Sense of regional identity among population

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This is an important suggestion since development scenarios always have a mobilising psychological effect - variants can then be assessed in the light of their possible costs and advantages.

3.2 Provisional diagnosis of indigenous potential reserves in disadvantaged regions

Indigenous potential reserves in European regions are currently mobilised in an entirely empirical manner. There has so far been no systematic analysis, mainly for lack of a theoretical method. A number of empirical studies carried out over the past few years have shown why and how the potential of disadvantaged and peripheral regions tends to fall in relative terms. Others have pinpointed a number of areas with hidden indigenous potential reserves, especially:

- the small and medium-sized industry and craft industry sector (technology, organisation, marketing, access to capital, etc);

- the development of human resources;

- the rural sector (agriculture, forestry, the agri-foodstuffs industry, rural tourism);

- maritime resources.

Over the past few years policies and initiatives designed to mobilise indigenous potential reserves have emerged in most European countries, leading to the establishment of special instruments and agencies. Still highly fragmentary and sectoral, they are not usually linked to a specific conception of physical planning. On the other hand, the mere existence of the new pattern of regional development is likely to challenge the content and normal practices of physical planning.

The following chapters take a closer look at indigenous reserves in the sectors listed above, the recently established special instruments and agencies and ways and means of co-ordinating the various initiatives, especially in spatial terms.

3.3 The small and medium-sized firms and craft industry sectors

3.3.1 Restrictions on the spatial mobility of technical progress

The concept of technical innovation and progress is a complex one, covering both various functions of a firm (innovation in products, production processes and internal organisation) and all the stages of technical progress from the findings of basic research through imitation to the saleable product. Product innovation makes it possible to improve the quality of existing products and manufacture new ones. Process innovation ensures a greater output for the same input of factors of production (increasing the productivity of the factors). Depending on the firm, the same innovation can be classified under one heading or the other. Thus a new machine tool is a product innovation for the firm manufacturing it, but a process innovation for the firm purchasing it. Organisational progress is still known as "unembodied progress", because it comes neither under capital nor under labour: it concerns the firm's structure and development, work programming, quality control, transport, stock management and the like.

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Technological innovation, which reduces production costs and increases the added value of products, is vital for industry in European regions because of the international situation described in Chapter 1. It differs from the other factors of production in one respect: whereas a unit of work or capital can be used only in one place, a piece of scientific information can be used in several places at once without being altered by technical skills. One might accordingly suppose that there were no restrictions on the spatial mobility and dissemination of know-how. The neo-classical theory of regional development, which postulates equivalent mobility of the factors of production (including technical skills), appears to agree with this hypothesis. It was only with the theory of polarisation, which introduced the concept of selective mobility of growth factors (in time and space and according to quality), that a theoretical explanation was eventually found for regional inequality in the face of technical progress. The divergent development of centres and peripheries is a cumulative process, in which backwash effects prove more powerful than spread effects. Technology spreads more easily within the narrow circle of major poles and urban areas. Several factors affect the spatial mobility of technical know-how (1).

A first group consists of general factors, valid throughout a given country, which affect the intensity and speed of the spread of know-how, but with variations arising from the structures of the various regions. They include legislation on competition (which reduces opportunities for co-operation between firms) and legislation on patents (whose protective effect stimulates research, but curbs imitation and strengthens tendencies to form cartels and technological monopolies; the information effect produced by registering the patent is limited because more and more inventions concern production processes which, though not automatically covered by patents, are protected by the "law of silence"). The degree of administrative decentralisation (a federal structure tends to equalise the regions' opportunities for innovation) and the general level of economic development (saturated markets intensify the need for product innovation) also have repercussions on the spread of innovation.

A second group of factors is the specific features of innovations in terms of their capacity to spread. The actual nature of an innovation enhances or reduces the impact of the other factors of diffusion. The operative features are: the complexity and scope of the innovation (complex technologies can only be adopted by retraining staff, so that complexity and scope may be a barrier to innovation in small and medium-sized firms, whereas innovations that can be split up into simple parts are easier to adopt); its comparative advantage over other technologies (especially the possibility of economising on a rare element of production); its compatibility with existing conditions of production (the firm's technical, organisational or socio-economic conditions can explain why innovations are slow to catch on); the possibility of observing and testing it; and its degree of maturity (which is conducive to spread as long as the risk of obsolesence is not too high).

A third group of factors affecting the spread of innovation is the characteristics of the firm concerned. The correlation between firm size and innovation activities (Schumpeter's hypothesis) is probable, but not entirely proven. Empirical studies show a good correlation between research and development expenditure (up to a certain threshold) and firm size, but

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(1) see C Muggli, P Güller: "Mobilität und Verfügbarkeit von Know-How". Arbeitsbericht Nt 6 NFP "Regionalprobleme in der Schweiz", Bern 1980.

firms may also grow because they innovate. Independent small and medium-sized firms display a hesitant approach to research (no planned, consistent, long-term programmes on products, processes or materials; fears of being unable to launch innovations successfully on to the market). Yet they innovate to a certain extent through a creative process which generally takes place at or around the production stage and, unlike its counterpart in large firms, involves a substantial proportion of the staff. The structure of the firm's market affects its capacity for innovation, partly because trends in consumer demand have a growing impact on the products supplied (there has been a considerable increase in innovations devised by firms' marketing departments), and also because a minimum sales volume (and consequently a minimum market size) is required to make an innovation pay. Furthermore, independent small and medium-sized firms concentrating primarily on the regional market are more flexible than subsidiaries of multi-regional and mulit-national firms when it comes to adjusting to variations in regional demand (in the north of England for instance, 50% of recently established independent small and medium-sized firms sell over 75% of their products on the regional market, as against only 12% of subsidiaries of large firms (1)).

However, exclusive concentration on the regional markets may in the long term cause a firm to fall behind.

The organisation of the firm (dividing the production process into stages and co-ordinating them) affects the spread of technical progress to a certain extent, whether in the form of internal organisation (various models) or that of relations between parent companies and subsidiaries. Where internal organisation is concerned, it has often been pointed out that the atmosphere produced by an excessively hierarchical model discourages innovation, and growing emphasis is being placed on the need for "specialised innovation promoters" in the various sectors of the firm (while small and medium-sized firms can call in experts from outside). In organisational matters, creativity in independent small and medium-sized firms seems to hinge on a relatively flexible production cycle, a stable group structure which maintains the various groups' ability to learn and optimise their memories and a relatively loose job differentiation system (preventing the isolation of research and development functions) (2). In multi-regional and multi-national firms, research and development activities usually centre on the parent company, while subsidiaries do not themselves supply information, but rapidly adopt the innovations handed down to them.

Financial organisation and access to risk capital

Promoting technological innovation compels a firm to increase both its operating costs and its investment budget. Operating costs are highest during the research phase (paying a team of research technicians), while investment capital is mainly needed to incorporate the innovation into the production system. Financial constraints are especially severe for independent small and medium-sized firms, which are normally family concerns reluctant to let

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(1) R Morley, "Employment, investment and regional policy in the Northern Region", Newcastle 1976

(2) T Ellwein, "Innovation und Innovationsbedingungen in kleinen und mittleren Betrieben des ländlichen Raumes", in "Informationen zur Raumentwicklung", Heft 7/8-1980.

outsiders acquire holdings, even on a minority basis. Access to risk capital is something of a problem for small and medium-sized firms, but easier for large firms.

A firm's sectoral specialisation has a certain impact on its capacity for innovation. In this respect production networks are even more important than sectors, since technical progress spreads vertically between the various branches of the same network. Trends in demand for finished products and productivity advances vary according to sectors and networks, and the combination of the two provides information on innovation potential in the various sectors.

A fourth group of factors affecting the spread of innovation relates to spatial differentiation (or locational effects). Firms' receptivity to technical progress varies according to their location, for several reasons. The more peripheral a region is, the poorer its access to information. There is a profound regional imbalance in the distribution of research institutions, patent offices, bodies issuing licences or advising firms on technological and organisational matters, and trade fairs and exhibitions. The imbalance is aggravated by the lack of high-level infrastructures in peripheral regions (eg airports, fast trains), which would normally offset the effects of distance.

The lack of skilled personnel in peripheral regions can be put down to both supply and demand. On the supply side, skilled personnel tend to leave peripheral regions because of the scarcity of promotion opportunities and the low level of cultural and educational facilities. Such regions are also under-equipped in institutions training skilled personnel (eg universities, research centres). On the other side, firms in peripheral regions have a low demand for skilled personnel because they are not prepared to offer comparable rates to the salaries paid to research staff, which they see as a threat to "social harmony".

Negative side-effects of exogenous development

The exogneous development of peripheral regions (decentralisation of firms, setting up of subsidiaries, foreign investment etc) which prevailed throughout the period of rapid growth has had negative side-effects leading to a considerable drop in these regions' capacity for innovation. The higher functions of regional firms (research, marketing, organisation) were systematically transferred to the parent companies as a result of mergers, while new subsidiaries created mainly routine jobs. This made it impossible to maintain enough skilled personnel and services to generate self-centred development. Most of the investment promoted in peripheral regions was low-risk investment in "mature technology". From the standpoint of dissemination, regional development grants serve to delay the adoption of new technology instead of speeding it up, and consequently fail to ensure an increase in regional potential by preventing these regions from gaining access to new, growing markets rather than those approaching saturation.

As the above analysis shows, many factors restrict the spatial mobility of technical progress to the detriment of peripheral regions. The result is a major disparity between central and peripheral regions in terms of innovation as the following examples show (1):

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(1) See Ewers, Wettmann, "Innovationsrückstände und regionale Innovationspolitik im ländlichen Raum", in "Informationen zur Raumentwicklung", Heft 7/8-1980; R Rothwell, "Innovation, small firms and regional development, Workshop on Regional Innovation Policy", Sophia - Antipolis - 1981.

- in the Federal Republic of Germany in 1977, the number of patents registered per number of employees or firms in the mechanical engineering sector was 4 times higher in developed regions than in backward regions. Similar results have been obtained for the relationship between the metropolitan region of Copenhagen and other regions in Denmark;

- out of 100 innovation projects in the microelectronics sector subsidised by the Ministry of Research and Technology in the Federal Republic of Germany, 85 were from developed regions and 15 from backward regions;

- small and medium-sized firms in south-east England produce approximately 2.5 times more major innovations than even larger firms in other regions such as Scotland or Wales (sample of 323 innovations between 1965 and 1978);

- other empirical results indicate that regions with high productivity high urban growth rates and high incomes are the first to adopt innovations, while peripheral regions lag behind by several years.

Technological innovation has a variety of effects, on volume of employment, industrial income and productivity, the environment, qualification levels, working methods and raw materials (eg scarcity, price). There may be conflicts, especially between the effect on income and the effect on the volume of employment: this occurs when a rise in earnings is equivalent to an increase in productivity, and when the latter is achieved mainly by innovation in production processes. This is a typical situation in peripheral regions where substantial investment in rationalisation releases large quantities of labour. The effect on job qualifications may be either positive or negative. When microelectronics was introduced, the two effects occurred simultaneously, producing a gap in qualification levels between skilled and shop-floor workers. But the relationship between technological innovation and job qualifications is a reciprocal, not a one-way relationship: a low level of skills can prove a barrier to the introduction of new technologies.

A good deal of research is currently focussing on the effects of technical progress on the labour market, which are more effectively studied in a microeconomic context, as A Heertje explains (1): "Discussion of the labour market lacks substance in a macroeconomic context, whereas additional microeconomic analysis can highlight very clearly the impact of technical progress on staff, firms and entire industries. While a macroeconomic analysis has its uses as providing pointers to the consequences of technical progress, a deeper understanding of technical development must ultimately relate to the activities that mankind has placed at the centre of the production process."

According to Heertje, the results of such analyses lead to the following diagnosis: "There is bound to be a major, on-going reorganisation of the various compartments of the labour market. Not only will workers have to undergo continuous re-training, but unemployment will arise whenever the introduction of new techniques reduces the number of workers required. The disappearance of old products and their replacement by new ones can produce

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(1) A Heertje, "Economie et progrès technique", Ed. Aubier-Paris, 1979, p. 209

drastic changes in employment patterns. The future trend is probably for decisions on technical progress to be based not so much on simple criteria like profitability as on more fundamental and subjective aspirations concerning the nature, direction and rate of technical development and its applications. The less employees consider technical progress inevitable, the more they will want to direct its course, or at any rate shape it to comply with their own aims."

As the above remarks show, the negative consequences of technical progress in peripheral and backward regions (the rationalisation of production being vital for some firms) must be offset by the development of other indigenous resources, whether natural or human.

3.3.2 Policies to promote innovation and develop small and medium-sized firms

Diagnosis of the development problems of independent small and medium-sized firms in peripheral and disadvantaged regions must be followed by a study of the special instruments and policies designed to raise these regions' potential by mobilising the development capacities of this type of firm.

In defence of this policy, it should be pointed out that over the past few years, several regions in Europe have achieved successful economic take-off based almost exclusively on the dynamic approach of independent small and medium-sized firms. Particularly striking examples are the central and northern Adriatic coast of Italy and the Swabian plateau in Baden-Württemberg.

The various instruments discussed here do not all derive from what are normally termed regional policies. Some of them are the outcome of national sectoral policies, especially on technology and research (promotion and dissemination of innovation) and education (regional universities).

Promoting innovation investment and research and development (R & D) projects in industry

A number of state-run financial promotion schemes in this area have been regionalised (to the extent that grants are higher in backward regions). In Ireland, the Industrial Development Authority (IDA) runs two promotion schemes: the New Industry Programme and the Small Industries Scheme. The latter provides for grants to industrial R & D projects (applicable to firms employing fewer than 50 people and to R & D projects worth less than £300,000 and covering up to 50% of capital, consultant and personnel expenditure). In Italy, the Applied Research Fund has traditionally benefited large firms in the northern regions, but since 1974 40% of the fund has been earmarked for the southern regions. In Denmark, the National Council of Technology ran special, partly regionalised schemes from 1977 to 1979 to promote management, marketing and process and product innovation in small firms employing fewer than 50 people. In the Federal Republic of Germany, various schemes are being implemented at federal level (the "Erstinnovations-förderungsprogramm" by the Ministry for Economic Affairs, the "Fachförderungsprogramme" and "Externe Vertragsforschung" by the Ministry of Research and Technology) and in the various Länder (Bavaria, Baden-Württemberg, Rhineland-Westphalia). They do not involve regional differentiation. The federal "Externe Vertragsforschung" scheme subsidises innovation projects for which firms call in outside advisory agencies. It applies to small and medium-sized firms

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with a turnover of up to 200 million DM; the grant cannot exceed 30% of the amount of the contract and is limited to 120,000 DM annually per firm. The experience of the past few years shows the average grant to be 24,000 DM per applicant firm. Half the assisted firms have a turnover of less than 20 million DM or employ fewer than 250 people. The Bavarian scheme to promote innovation, which has operated since 1980, provides for grants covering 50% of the cost of launching an innovation process. Grants in the Land of Baden-Württemberg cover up to 50% of the cost of innovation and development projects for small and medium-sized firms with a turnover of less than 200 million DM. Most of the assisted firms have less than 50 million DM turnover and employ fewer than 500 people. Loans at subsidised interest rates (4%) are available for new product development. The "Technologie-Programm Wirtschaft" in the Land of Rhineland-Westphalia, which has operated since 1978, subsidises the entire cycle of innovation from research to marketing with separate grants for each of three stages:

- the R & D stage: 50% grant for research, trials, prototypes, construction of laboratories, hiring of advisers and experts, contracts to specialised agencies;

- the introduction of new technology into the production process: 20-30% grant (the rates can be higher in disadvantaged regions) for investment in new plant;

- the production and distribution stage: 20% grant for marketing operations.

Firms are selected primarily according to the degree of innovation represented by the proposed operations (for small and medium-sized firms, it is mainly a question of combining known elements in new ways to produce new solutions) and job creation (failing which, the application must offer such advantage as pollution control, energy savings or alternatives for costly raw materials). In 1980, 60 million DM were distributed as part of this programme the average grant being of 533,000 DM per project. Firms in urban areas received more grants than others.

Promoting the development of R & D teams in industry

Since one of the major curbs on the spread of technical progress to small and medium-sized firms is lack of skilled personnel, a number of schemes exist to subsidise expenditure on skilled personnel in the R & D sector.

In the Federal Republic of Germany, the "Forschung und Entwicklung-Personal-kostenzuschüsse" scheme (grants for expenditure on R & D personnel), financed by the federal government and run by the "Arbeitsgemeinschaft industrieller Forschungsvereinigungen" (an association of 87 research agencies in the industrial sector), is directed at independent small and medium-sized firms with a turnover of up to 150 million DM, employing fewer than 1,000 people. The maximum annual grant is 400,000 DM. The amount is calculated on the basis of R & D personnel salaries over the preceding year. In 1979 the average grant per firm was 77,600 DM. 65% of assisted firms have fewer than 200 employees. Since 1978 300-350 million DM have been distributed annually under the scheme.

In the Netherlands, the government report on technological innovation proposes a grant system, without regional differentiation for the salaries of R & D personnel.

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In France, regional policy provides for the payment of special grants for the location of tertiary (PLAT) or research activities (PLAR) in disadvantaged regions. However, they are allocated only once and are calculated on the basis of the number of jobs created (the minimum threshold being 30 jobs over 3 years) rather than the volume of salaries concerned. In 1977 48 million FF were thus distributed for 54 operations.

Promoting innovation advisory centres

In most European countries there are numerous innovation advisory centres of extremely varied origin, some of them backed by funds from public agencies.

In Great Britain a wide range of organisations assist small and medium-sized firms, from mere advisory centres to agencies carrying out basic and applied research.

In Italy, small and medium-sized firms can seek advice from many private or semi-public organisations including the Agency for technological promotion in small and medium-sized firms in the south, set up by the Naples Chamber of Commerce. The Industrial Reorganisation Act of 1977 supports the establishment of specialised agencies (consortia) to advise small and medium-sized firms in the southern regions and provides for a part of the Applied Research Fund to finance the transfer of technology and the diffusion of innovation.

In the Netherlands, the regional development agencies (ROM) set up between 1974 and 1978 have a variety of functions, one of them being to stimulate technological innovation in firms in their regions. Other agencies include the Centre for Planning and Innovation in Industry, set up by the employers' association of the northern provinces and financed by the Northern Development Fund, and the Advice to Industry Centre in Limburg, subsidised by the Ministry for Economic Affairs.

In the Federal Republic of Germany a large network of agencies encourages the transfer of technology and promotes innovation in small and medium-sized firms. The following account deals with those which are not regional offices of a national agency (the others will be considered in a later chapter). They may be set up by chambers of commerce and industry, local authorities, trade unions in various branches of industry, and so on. Thus, the two Chambers of Commerce and Industry of "Mittlerer-Neckar" and "Ostwürttemberg" have set up a joint advisory centre on technology and innovation to assist small and medium-sized firms by:

- transferring information: collecting details of specialised publications and patents from various sources (research reports, specialised journals, data banks etc);

- putting small and medium-sized firms in contact with agencies specialising in technological matters (universities, research centres, other industrial firms);

- informing them about the financial promotion of R & D by public agencies.

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The Eastern Bavarian Technology Transfer Institute (OTTI Ostbayerisches Technologie - Transfer Institut), set up in Regensburg, with financial backing from the Federal Ministry of Research and Technology and the Bavarian Ministry for Economic Affairs has about 100 members including chambers of commerce and industry, municipalities, districts, industrial firms and private individuals. It aims to promote technology transfers to small and medium-sized industries and craft industry, and to find the right solution in each specific case. It employs five full-time specialists with access to national and foreign technological data banks, specialised agencies, experts and so on. Applications are dealt with as follows:

- application by a small or medium-sized firm wishing to modernise;
- visit to the firm by one of the five specialists;
- research on the state of technology (data banks);
- request for information from outside experts;
- verification of the information by other experts;
- putting the firm in contact with the experts;
- study of the forms of financial aid available to the firm;
- help with drafting the firm's grant applications;
- monitoring the results.

The institute also holds specialised seminars. Similar agencies in the Federal Republic of Germany include the "Technologie - Vermittlungsagentur" in Berlin, the "Technologieberatungstelle Ruhr e V " at Bochum, and the "Technologiezentrum des Vereins Deutscher Ingenieure".

In France, the previous government had already launched a number of operations to:

- make scientific and technical information more accessible to small and medium-sized firms;
- set up multi-purpose technical support centres to assist them, especially in creating and trying out new products;
- equip regions with advisory centres specialising in industrial research areas relevant to regional industry.

Multi-purpose technological assistance centres for small and medium-sized firms have already been formed in Alsace, Aquitaine, France-Comté and Languedoc-Roussillon. Experimental innovation workshops have been set up in two areas with scattered small and medium-sized industry in the Charentes and the Orne. Product control and testing centres offering more conventional forms of technical aid have been introduced in Lorraine, Midi-Pyrénées, Nord-Pas-de-Calais and Rhône-Alpes. A substantial number of technical research centres specialising in a wide range of sectors (eg textiles, agri-foodstuffs, leather

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and brewing industries) have also appeared. Lastly, the experimental "contrats de pays" (local development schemes) have promoted numerous sources of local economic aid (multi-purpose service agencies, economic aid to management, sub-contracting arrangements and so on).

Decentralising national agencies in charge of R & D policy

To maintain their impact and operate near small and medium-sized firms, national agencies in charge of R & D policy and the diffusion of technological information have had to set up regional branches.

In Denmark, the National Council of Technology has established a technological information service with regional branches. In the Netherlands, the National Industry Service has a branch in each province to advise industrial firms on technological matters. As a result of the National Report on Innovation, each province has been asked to set up an industrial policy and innovation office.

In the Federal Republic of Germany, the Council for Rationalisation of the Economy (Rationalisierungs-Kuratorium der Deutschen Wirtschaft) is carrying out pilot operations in technological promotion and development, organisation and management at the request of the Federal Ministries of Research and Technology and Economic Affairs. Their purpose is to develop forms of aid to small and medium-sized firms which are both supra-sectoral and suited to their needs, test the extent to which technical advisers act as catalysts in their dealings with firms, administrative authorities and specialised agencies, and assess the desirability of government-backed agencies to advise this type of firm. Structurally, the organisation is decentralised, with a head office and five regional branches. The operation's originality lies in its attempt to consider the social consequences of new technologies as well as raise productivity. This is done by a central committee and four regional committees comprising representatives of labour, management, and scientific and government agencies.

In France, a network of regional scientific and technical information agencies (ARIST) has been formed on the basis of earlier experiments in Nantes, Toulouse and Lyon. Agencies have been established in Strasbourg, Clermont-Ferrand, Marseille, Montpelier and Lille, with branches in Limoges, Bordeaux and Nancy. In Ireland the IIRS (Institute for Industrial Research and Standards), located in Cork and Shannon, offers technical advice to industry.

Promoting co-operation between technical training and research institutions and small and medium-sized firms

Experience has shown co-operation between regional technical universities (eg engineering or higher technical training institutes) and small and medium-sized firms to be very limited indeed. In several countries strengthening it is part of government policy.

In the Netherlands, technology transfer centres which are open to industry have been set up in all engineering institutes. In Bavaria, "contact centres" for small and medium-sized firms have been formed in engineering and higher technical training institutes, and teaching staff engaged in this type of work receive extra pay. In Britain the planned Merseyside Innovation Centre is designed as a link between university research and regional development.

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Setting up science parks

The purpose of science parks is to create a complex of highly innovative establishments and thus create a climate of synergy leading to the proliferation of innovations and the development of joint services to the firms concerned.

Such parks exist in Britain at Warrington, Bristol (Aztec West) and the University of Cambridge (University Science Park). A project is planned in the Twente region of the Netherlands (Technology and Business Centre). The Sophia-Antipolis Centre near Nice fulfils the same function.

Decentralising research institutions

These schemes are directed at the public and private sectors alike. In the public sector the greatest efforts have been made in France, because public research institutions are so heavily concentrated in the Paris area. In the private sector, several countries allocate grants for decentralising research activities or launching them in disadvantaged regions. In Italy the Mezzogiorno Act of 1976 introduced grants for the development of scientific research centres, especially those linked to productive activities (the minimum requirement being a staff of 20). In France there are grants for the location of research activities (PLAR).

Promoting marketing agencies

One of the major problems facing independent small and medium-sized firms in peripheral regions, unless they engage exclusively in sub-contracting, is how to establish links outside the region, especially in marketing. Because of their size and sales volume, these firms can hardly maintain specialised marketing teams, whereas multi-regional and multi-national firms are often linked to marketing networks on a transcontinental scale. As was noted earlier, a number of national schemes subsidise advice-to-industry operations, especially in marketing, which amounts to an indirect promotion of marketing agencies. Various forms of direct assistance, particularly in the initial stage, are available to both independent private agencies and co-operatives formed by a number of industrial firms. In France, "contrats de pays" have achieved some results in this area. In other countries, instances of this type of promotion are still few and far between.

Promoting the supply of risk capital

There seem to be no restrictions on the inter-regional mobility of savings, ie capital. Risk capital (long-term loans for highly innovative development projects) should accordingly be easily accessible to small and medium-sized firms in any region. Yet experience shows this to be far from true. Banks specialising in this type of operation are highly centralised and prefer to deal with large firms; their expert evaluation departments which analyse the risks involved in the proposed operations are very poorly represented in peripheral regions. Small and medium-sized firms have close links with regional banks, which practise a rather tight credit policy where risk capital is concerned and prefer to grant short and medium-term loans for low-risk investments (mature technologies). This problem exists in most countries.

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In several cases, regional development agencies have been set up to increase the supply of risk capital (eg France, Netherlands, Portugal). It is also planned, among other things to alter regulations restricting the use of regional savings for productive investments.

Promoting integrated indigenous development schemes

The schemes described above all have a distinctly sectoral bias, though some are applied simultaneously and may produce a cumulative effect. A number of indigenous development schemes are so designed as to achieve a more integrated approach.

One of these is the French experiment with "contrats de pays", intended by their promoters to serve as genuine micro-regional development programmes in which the contract is only the first phase of the operation. They involve a wide range of measures to promote economic development (services to industry, organisation of sub-contracting), exploitation of existing resources and activities (adding value on the spot to local products, associations of craftspeople or small and medium-sized firms, use of local savings) and arrangements for the reception of the young working populations (training schemes suited to the local labour market). Though they have helped to stimulate concerted action and initiative among local authorities and an effort at coherent, novel approaches on the part of central government, the inadequacy of the funds invested in them has severely restricted their scope.

Another noteworthy experiment concerns regional programmes in the county of Värmland in Sweden (1), which has a series of structural problems and a high emigration rate. Several revival projects have been launched to create activities and jobs by developing the region's natural resources and the population's technical know-how, to introduce industrial services and to buttress existing small and medium-sized firms. The basic principle is to develop a whole series of activities simultaneously in order to take advantage of the synergistic effects: consulting outside experts, defining sub-projects, providing vocational training, making arrangements for informal co-operation between firms in the region, developing science parks ("industrial houses"), and so on. The scheme's most original feature is no doubt the hiring of "intrapreneurs" - individuals or groups who are given the opportunity to develop new industrial activities (processes or products) within existing firms, using the firm's capital, from the initial idea right up to the end-product.

An interim assessment of the projects suggests that numerous forms of intra-regional technical co-operation can be achieved by provoking a catalytic, synergistic effect, but the results are not immediate and the costs are high. Consultants of a new type have to be trained, combining technical skills with a knowledge of human relationships and long-term planning, and a grasp of overall problems.

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(1) ß Näsland, "Regional development projects in the county of Värmland in Sweden". Workshop on "Regional Innovation Policy", Sophia-Antipolis 1981.

Evaluating policies to promote innovation and develop small and medium-sized firms

The following is not a systematic assessment of the policies applied in various countries, because they are a recent development and little information is available on their effects. A few general remarks will suffice.

- Policies to promote innovation for the benefit of small and medium-sized firms are still in their infancy. Few countries apply the entire range of measures described above and there is still room for considerable progress.

- Most current policies to promote innovation are of insufficient benefit to disadvantaged and peripheral regions. National R & D policies should be subject to regional differentiation and co-ordinated with regional policies.

- A detailed analysis of small and medium-sized firms' needs can only be made at regional level. National agencies in charge of R & D policy generally have a fairly centralised decision-making infrastructure because they maintain close links with large firms. They often lack a network of regional branches to establish contact with small and medium-sized firms.

- Promoting innovation must be a multi-functional policy designed both to supply services and information (eg technological information centres in disadvantaged regions, arrangements for co-operation with technical universities, vocational training establishments) and to satisfy the technological assistance requirements of small and medium-sized firms (population of innovation policy, easily accessible advisers to direct firms towards the relevant consultancy services).

- The efficiency of technology transfer depends on a variety of criteria. The first is a thoroughly up-to-date potential in terms of technical and economic skills and a good capacity for analysing and solving complex problems. Small and medium-sized firms must have opportunities for direct, personal contact with experts, research institutes and universities. Technical advisers must be able to create an atmosphere of confidence, to avoid giving management the impression that technical skills are being exchanged mainly at their expense. Lastly, an effort is needed to overcome obstacles arising from differences in working methods (the question of deadlines) or professional terminology.

- In the case of severely depressed areas, integrated schemes (eg on the Swedish model) may prove more effective than excessively sectoral measures.

3.4 Turning human resources to good account

Human resources are one of the major indigenous development factors in disadvantaged regions. They can be turned to account in three complementary, rather than mutually exclusive, ways:

- vocational guidance and careers information as part of school education, to forge an initial link between school and working life;

- traditional vocational training, which includes vocational training for young people, adult education and complete retraining schemes, in the form of long courses (several years) attended on a full-time basis or sometimes concurrently with a job;

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- training/development operations required for the economic revival of disadvantaged regions, in the form of short courses (a few weeks or months) to supplement basic vocational training, the main purpose being to eliminate a number of blocks in micro-economic development processes and create the conditions for exploiting the potential of disadvantaged regions.

3.4.1 Vocational guidance

In its traditional form, vocational guidance is rarely an integral part of school education. It is usually dealt with by specialised establishments (poorly represented in peripheral rural regions, anyway) which use schools as distribution centres for appropriate publications. Vocational guidance and careers information should be incorporated into school curricula, with particular emphasis on occupations that can be pursued in the region itself. This type of vocational guidance still seems to be the exception, but a number of experiments have been launched such as the "Casebook of Careers Education Material" prepared by the Scottish Highlands region (1), which might serve as a starting point for similar efforts elsewhere.

3.4.2 Traditional vocational training

There is a certain amount of prejudice against training local people in disadvantaged regions and using skilled labour in those regions' productive systems (2). It is argued, for instance, that training investment is unprofitable because it encourages emigration, and peripheral regions are judged incapable of innovating because they depend entirely on technology from central regions. This is not borne out by the facts. Many independent small and medium-sized firms have been established in peripheral rural regions on the basis of human, not financial, capital. Their demand for skilled workers is relatively high because their division of labour is less pronounced than elsewhere. Automation is difficult in these circumstances. The lack of skilled labour hampers development. Since these firms depend for survival on a flexible response to changes in product demand, their innovation activities are quite highly developed. Thus, while the promotion of human capital is not an entirely new policy in peripheral rural regions, it is still attended by constraints.

- Vocational training and higher education facilities are inadequate in many peripheral and disadvantaged regions. Depsite the efforts of the 1960s and early 1970s, numerous gaps remain, especially considering the rapid rate of population growth in these regions.

- The dual system of vocational training (in both specialised establishments and industry), as practised in some countries like the Federal Republic of Germany, has its advantages and disadvantages. On the one hand, it palliates the lack of training vacancies in specialised establishments and thereby reduces

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(1) J Hermiston, "Casebook of Careers Education Material", Highland Regional Council 1980

(2) R Derenbach, "Qualifikation und Innovation", in "Innere Kolonisation" Heft 2, 1981

the problems facing disadvantaged regions. On the other (1), training opportunities in industry reflect the region's economic structure and prevailing production conditions: existing skills are reproduced, or at best, remaining gaps are partially filled. Firms plan their training programmes on the basis of their current needs or short-term prospects.

- The training efforts of the past few years have failed to ensure proper use of the trained personnel, only some of whom are effectively incorporated into productive activities. The rest have no decisive impact on economic development. Unskilled jobs in disadvantaged regions are increasingly held by skilled personnel, largely because subsidiaries of large firms offer better social benefits, higher salaries and greater job security at the expense of skill levels.

- A surplus of skilled workers in some sectors (building) is coupled with a deficit in others (eg mechanical or electrical engineering).

Traditional vocational training can be improved in several ways:

- by making the system more "transparent" and providing better information on training opportunities available in the region;

- by improving training facilities in the most deprived regions;

- by bringing schemes into line with the regions' development potential;

- by devising applied training programmes closely resembling actual practice.

3.4.3 Training/development operations

Training/development operations are primarily directed at the most disadvantaged regions and closely linked either to development possibilities in a region or micro-region or to specific development projects. They involve a series of courses of varying length. This type of operation is still in the experimental stage; at European level it is promoted mainly by the European Social Fund.

Various types of training course can be considered:

- Training local development agents in order to boost the economic function of local authorities and professional associations

Those in charge of local economic policies, whether in the public sector, the semi-public sector or professional associations, must be able to devise a development strategy for their micro-region. This type of training must enable local development agents to:

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(1) W Brosi, K Hemback, H Spehl, "Was macht die Eingliederung der nachwachsenden Generation in Ausbildung und Beruf im ländlichen Raum so schwierig?" in "Innere Kolonisation" Heft 2 - 1981

- recognise the real development potential of each target area,
- pinpoint the factors that obstruct development,
- spread information on ways and means of creating new activities,
- assess the actual resources to be mobilised for the purpose,
- mobilise individual energies to carry out the chosen strategy.

Local agents trained along these lines can become educators themselves and contribute to the self-perpetuation of the indigenous development process.

- Training individuals or groups wishing to carry out a development project

Development projects, which can be extremely varied (eg establishment of a craft or industrial enterprise, technological innovation, manufacture of new products, development of local resources), require a wide range of skills; lack of these may prove a decisive barrier to the birth of innovative projects. This type of training must raise the skill levels of the people concerned (eg awareness of financing possibilities, administrative regulations) and increase the local population's support for, and participation in, current and forthcoming projects.

- Training to consolidate existing activities

This type of training aims to improve technical skills (new materials, new technologies, re-learning neglected local technologies) and familiarise the trainee more fully with market regulations and processes. It must increase the value of participation by certain categories (eg craftsmen's wives, young people) in the management of family concerns, and facilitate research on the structural changes required in certain micro-industrial, craft or service activities to secure co-operation, association or integration. The links forged between the trainees may play a decisive part in future solidarity between firms.

- Training to diversify activities and foster multiple family activities

Multiple family activities and the resulting extra income may prove an essential incentive if certain sections of the community are to remain in severely disadvantaged regions (eg hill communities). To prevent multiple activities from leading to the deterioration, rather than the improvement, of rural people's working and living conditions, training must include information, case studies, credibility tests, details of existing regulations (social welfare benefits, tax schemes) and the like.

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It can cover rural tourism (cross-country skiing, riding, hiking, discovery of the local heritage or of popular cultures and traditions, farm or guest-house accommodation and catering for tourists, camping), activities within the family or in village workshops (creation of added value in farm produce, market preparation and processing of local products, crafts) or activities outside the family, especially services (collection and distribution, home-help arrangements, geriatric training to assist hospital staff, etc).

Training/development operations require specific forms of organisation at several levels:

- an umbrella association covering all the territorial, professional, trade union and administrative bodies concerned with regional development, which promotes the entire operation;

- a technical unit which prepares, organises and manages the administrative, financial and educational aspects of the operation and relations with supervisory and funding agencies;

- an advisory educational committee which assists the technical unit at each stage;

- local steering groups, ie the formal or informal authorities engaged in a development project, which can adapt the training course to the project requirements and organise extra activities to consolidate the training received.

3.5 The rural sector (agriculture, forestry, agri-foodstuffs industry, rural tourism, agri-energy)

Indigenous development in the rural sector can take many forms, of which the following is simply a very brief review. Agriculture and related activities play an important part in the economy of disadvantaged regions, despite frequent criticism of their low productivity, the profusion of small farms, the underdeveloped state of agri-foodstuffs industries and so on. It must be remembered that such assessments disregard:

- future potential demand (other types of products),

- the fact that releasing the workforce in the agricultural sector is no longer a highly desirable objective since industry can absorb virtually none of it,

- the fact that massive aid to surplus production under the Common Agricultural Policy, which artificially over-values the productivity of certain regions (most of them not disadvantaged), is not something which can never change.

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While the structure of agriculture in most disadvantaged regions is undeniably rather weak, a number of potential trends may well succeed in strengthening it. These are as follows:

The development of agri-foodstuffs industries. Most disadvantaged regions are lagging behind in the agri-foodstuffs sector, though the general trend is encouraging. While these activities, which bring appreciable added value to regional agricultural industries, should clearly be developed further, several pitfalls must be avoided. The agri-foodstuffs sector is on the whole sectorally concentrated, with decision-making centres often far from production areas. To avoid a pattern similar to that which has developed in the industrial sector over the past few decades, it is important to concentrate on strengthening strictly regional firms. In many regions small units are already flourishing, often attached to large farms or production co-operatives. It must also be borne in mind that technology is advancing fast in this sector. Disadvantaged regions must acquire the means of employing modern technologies.

The development of hitherto unprofitable industries. Despite widespread assumptions to the contrary, Europe imports a number of agricultural and fish products (eg animal feed, cattle-cake). Rather than producing, under difficult conditions, goods of which there is a surplus on the European market (and which are therefore threatened in the long term by a reform of the Common Agricultural Policy), disadvantaged regions would do well to plan some reconversion operations into sectors where there is genuine demand.

The development of energy-producing agriculture and bio-industry. Agriculture is about to become an energy producer. The constantly rising prices of oil products have made it profitable to manufacture bio-fuels, which will be discussed in greater detail in the chapter on renewable sources of energy. More than others, disadvantaged regions can take advantage of their land reserves to develop this type of activity.

The bio-industry sector, which is in its infancy but seems to be advancing very fast, may offer development opportunities for disadvantaged regions. These industries use biological techniques (bacteria) to process basic materials (which may be of agricultural origin like cellulose, grain, seaweed, potatoes or milk serum) into all sorts of finished products, some of which can in turn be used in the agricultural sector (eg fodder proteins, fertilisers).

Rural tourism has developed appreciably over the past few years and is now an extra source of income for the rural economy. It is especially important in disadvantaged regions (mountain areas), because it helps to stem the population drain.

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3.6 Renewable sources of energy and the rationalisation of regional energy-production systems

The renewable energy sector comprises sources of energy which are available in highly specific regions, such as wind power (coastal and hilly regions) or geothermal energy (hot water springs or aquifers), and more widely distributed sources such as biomass (plant energy) and solar energy (more important in Southern Europe).

The following discussion focuses on the biomass sector because of its potential importance for most of Europe's disadvantaged regions. Biomass (1) comprises all the plant matter created by photosynthesis and, by extension, animal products and those of related industrial and domestic activities. A partial return to renewable carbon through the use of new technologies should be a major development of the coming years. The most suitable material for immediate development is undoubtedly waste from agriculture, forestry and related industries, which is currently unused. Energy-producing crops should be developed primarily in the light of experience acquired in the forestry industry (from coppicing or the introduction of resin-producing trees), the pulp industry (forests with short felling cycles, reeds), the fodder industry (grasses) and even the sugar industry (sugar beet). New species may then emerge (euphorbia). The aquatic environment should also be a source of supply (water hyacinths, algae in lagoons, seaweed). Trees with short felling cycles suited to the production of granules, gas and methanol are particularly important. The bio-fuel obtained may be solid (wood, straw, brushwood), liquid (alcohol, methanol) or gaseous (methane). Crops for biomass production require (currently fossil) energy for soil preparation and essential agricultural operations (manuring, treatment). Biomass can be profitably exploited only if the amount of energy produced (output) clearly exceeds the amount of fossil energy consumed. The minimum viability threshold seems to be five Tonnes of Oil Equivalent (TOE) net per hectare per year, after transport to the factory and before processing. In the case of wheat crops, using a third of the straw for energy-producing purposes is enough to pay for the entire input required to produce the grain and harvest the straw, including the cost of fuel for the machines.

Developing energy-producing crops is necessarily a slow process (introducing them into agricultural and forestry settings, establishing agri-energy production plants to process the products, relative price situation). In France it has been estimated that such crops will cover 100,000 ha by 1990 and produce approximately 0.4 million TOE. The potential French yield should not exceed 30 million TOE, to be produced over 7.5 million ha. Beyond this amount, pressure on land use might become too strong. Even now the exploitation of biomass is meeting a significant proportion of the country's energy requirements by the use of wood industry waste and the domestic use of wood in the countryside.

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(1) P Chartier, "Le potentiel énergétique de la biomasse", in "Futuribles", January 1980.

Developing biomass exploitation for energy-producing purposes may raise a number of agronomical problems, such as the insufficient return of organic matter to the soil or the depletion of mineral resources. Hence the need for attendant research to determine the impact of this type of programme. From the economic and social points of view, however, developing such projects may be a highly positive step, especially in terms of maintaining a certain level of economic activity and creating jobs in disadvantaged rural areas.

Exploiting indigenous potential in the area of energy production also means rationalising existing energy production systems:

- installing heat pumps;
- recovering heat in power stations and industry and using it for district heating;
- recovering gas from waste water treatment plants;
- improving the yield of existing small hydroelectric generating stations;
- using domestic waste for collective heating (district heating plants, gas turbines fuelled by pyrolysis);
- replacing individual gas heating by collective heating wherever possible;
- developing gas distribution networks in rural regions to reduce oil consumption.

It is particularly important to rationalise energy-production systems in rural regions which are heavily dependent on oil for heating and traffic (fuel oil, diesel oil, petrol).

It is to be hoped that regional energy production schemes based on the exploitation of regional sources of energy will gradually be worked out. To assist the process, each region should produce a map of its renewable sources of energy and a quantitative assessment of its energy situation, listing the various forms of energy consumed and the extra energy resources required which might usefully be mobilised (eg list of net resources, estimate of mobilisable capacities, economic costs of mobilisation, impact on employment, environmental consequences).

3.7 Marine resources

Coastal regions in Europe possess considerable development potential in the shape of marine resources.

Leaving aside the potential economic impact of the development of the ocean bed (eg the extraction of multi-metal nodules), the following brief discussion focuses on coastal marine resources, which come under aquaculture (or sea farming) and take the form of plant (algae) or animal crops (fish and shellfish).

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Plant aquaculture is open to various uses (eg energy production, chemical industry, fodder production). Animal aquaculture covers two main groups of activities:

- shellfish production on the seabed, which is fairly simple and requires a large workforce but little investment;

- fish-farming (eg salmon, trout) in cages or closed fishponds, which requires much more substantial investment in capital and technical skill (eg disease control, maintenance of water quality, determining optimal feed, securing sources of alevin supply).

It looks as if the development of animal aquaculture may in the medium term permit a partial reconversion of the fisheries workforce, in view of the difficulties facing the fishing sector. For the moment it is at the experimental stage in Europe (except for shellfish farming). Many countries are engaged in large-scale R & D activities. In Ireland, for instance, the University College of Galway is conducting research on genetics, pathology and nutrition. It also offers a training course leading to a national aquaculture degree. Several R & D centres have been set up on the west coast: the "Beirtreacht Teo" centre exists to promote shellfish farms in the Gaeltacht, while the "Braden Mara Teo" centre works on salmon and trout-farming in the sea.

In Italy the "Consorzio Ittico Tirreno" project at Salerno includes a research programme on fish-farming. In Sicily there are plans to expand and co-ordinate the aquaculture operations started in the Trapani salt marshes and the Stagnone at Marsala. To help restock the coastal areas with fish, artificial reefs are to be built off Tarrasini.

In the Federal Republic of Germany, various institutes are studying ways and means of developing aquaculture (the "Institut für Küsten- und Binnenfisherei" at Hamburg, the "Institut für Meereskunde" at Kiel and the "Biologische Anstalt" at Helgoland).

In France, a national committee for aquaculture and coastal biological products has been formed and various regional centres for the promotion of aquaculture have appeared along the Atlantic coast and in the Languedoc-Roussillon.

4. IMPLICATIONS OF AN INDIGENOUS REGIONAL DEVELOPMENT POLICY FOR PHYSICAL PLANNING

Given the current economic situation, the revival of peripheral and disadvantaged regions, which were poorly industrialised during the years of rapid growth and are described at the beginning of this study as "second-generation reconversion zones", must be based primarily on increased support for local action. The opportunities for territorial redistribution of growth are commensurate with growth itself - ie slight. The traditional tasks of physical planning (eg construction of major infrastructures, geographical redistribution of activities) are gradually being replaced by more widespread operations closer to grassroots level, and the decentralised and deconcentrated administrative structures of physical planning are taking

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on more and more importance. Traditionally supply-oriented physical planning (distribution of funds, incentive payments and infrastructures) will in future have to be receptive to demand, and consequently prepared to support and foster local and regional initiatives. To promote indigenous regional development, physical planning will have to adjust on a number of points:

- a greater impact on certain sectoral policies

- industrial research and technology policies

In this area it is important to step up regional differentiation (ie give more aid to backward regions), promote more transfers of technology (instead of granting aid almost exclusively to advanced technologies) and pay greater attention to the needs of small and medium-sized firms.

- vocational training policy

Traditional vocational training must give higher priority to applied training and to skills lacking in the region concerned. Efforts must be made to promote training/development operations, which involve shorter programmes and lead directly to the creation or consolidation of jobs in disadvantaged regions. It is also essential to train educators in indigenous development and advisers to small and medium-sized firms.

- energy policy for rural and disadvantaged areas

To reduce these regions' excessive dependence on oil (poorly developed gas distribution networks, inadequate public transport systems), steps must be taken to develop renewable sources of energy as soon as possible (eg biomass, solar energy) and carry out the necessary rationalisation and substitution operations in the traditional energy sector (eg extending gas networks, installing heat pumps, using domestic waste for gas production by pyrolysis, developing public transport).

- agricultural and fisheries policy

Physical planning policy must put an end to rural depopulation, because there are not enough jobs in towns. This means creating acceptable living conditions in rural areas by encouraging greater productivity in agricultural industries (packaging, agri-foodstuffs), their partial reconversion to non-saturated sectors (eg soya), the promotion of widespread rural tourism, multiple activities in the family and the development of agri-energy. Declining fishing activities can be reconverted with the growth of aquaculture.

- cultural policy

Interregional inequalities in living standards are often coupled with cultural inequalities. The key to a successful strategy of indigenous development is mobilising the local population. The more people identify with the region's future, culture, values and lifestyles, the more motivated they will be. Cultural policy can be a tremendous help in creating the conditions for indigenous development.

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Promoting new infrastructures and inductive tertiary activities

- multi-purpose technical support centres (technology, organisation, marketing) to back small and medium-sized firms;

- centres specialising in industrial research in areas relevant to regional industry;

- a network of scientific and technical information centres;

- a telecommunication and tele-informatics network;

- machinery for co-operation between educational and research institutions and small and medium-sized firms.

. development grants for independent small and medium-sized firms

The system of regional grants for establishing and expanding industrial firms must be adjusted to enable small firms, for which aid can be crucial. to take advantage of it.

. increasing the supply of risk capital

As the supply of risk capital in peripheral and disadvantaged regions seems to be largely instrumental in blocking the development process, it is important to create suitable conditions for channelling regional savings into productive investments and setting up or consolidating regional development agencies.

. devising integrated local development schemes

Developing indigenous regional potential must not be taken to mean applying a set of independent sectoral policies: indigenous resources are closely interdependent and it is by exploiting them simultaneously that the requisite synergistic effect can be obtained. It is therefore up to physical planning authorities at regional level to make an exhaustive analysis of local and regional indigenous resources and draw up an integrated development scheme based on all the mobilisable resources. Besides respect for natural and ecological balance, such schemes must have two essential components: on the one hand, assessing the opportunities for job creation or consolidation and the skills required, and on the other, planning the conversion of human resources to potential activities.

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