

**COMMISSION  
OF THE  
EUROPEAN COMMUNITIES**

Directorate-General for  
Regional Policy

**INTERNAL DOCUMENTATION  
ON  
REGIONAL POLICY  
IN THE COMMUNITY**

**THE MOBILISATION  
OF  
INDIGENOUS POTENTIAL**



**COMMISSION  
OF THE  
EUROPEAN COMMUNITIES**

Directorate-General for  
Regional Policy

*Brussels*

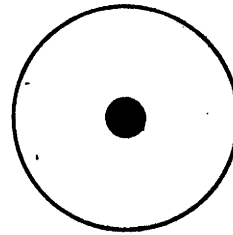
**INTERNAL DOCUMENTATION  
ON  
REGIONAL POLICY  
IN THE COMMUNITY**

**THE MOBILISATION  
OF  
INDIGENOUS POTENTIAL**

**No. 10 - September 1981**

XVI/298/80

**Wissenschaftszentrum**



**Berlin**

**THE MOBILISATION OF INDIGENOUS POTENTIAL**

**Regional Adaptation to Changing  
Technical and Economic Conditions  
by Means of the Rapid Adoption of  
Innovations - A Pilot Project**

**PROJECT REPORT**

**Reinhart W. Wettmann**

**Enrico Ciciotti**

**INTERNATIONALES INSTITUT FÜR MANAGEMENT  
UND VERWALTUNG**

**INTERNATIONAL INSTITUTE OF MANAGEMENT  
WISSENSCHAFTSZENTRUM BERLIN**

Platz der Luftbrücke 1-3

1000 Berlin 42

Telefon (030) 691 30 84



This study was undertaken at the initiative of the Government of the Federal Republic of Germany and was carried out by the International Institute of Management, Wissenschaftszentrum Berlin. It was jointly financed by the Federal Ministry for Economics and the Commission of the European Communities.

The study is available in English, French and German.

\*  
\* \*

The present study does not necessarily reflect the views of the Commission of the European Communities on the subject matter of the study nor does it necessarily anticipate the future attitude of the Commission on the topic.

\*  
\* \*

Reproduction of any part of this study is only allowed with the permission of the Commission and the above nationale authority.

This study has been prepared by

Reinhart W. Wettmann

Enrico Ciciotti

This study is based on information collected in the following national reports:

CICIOTTI, Enrico, The Mobilisation of the Indigenous Potential in Italy, A Regional Policy Strategy, Milan 1979  
(I)

EWERS, Hans-Jürgen; WETTMANN, Reinhart et al., Innovationsorientierte Regionalpolitik, Bonn 1980  
(D) Schriftenreihe des Bundesministers für Raumordnung, Bauwesen und Städtebau

GODDARD, John et al., The Mobilisation of Indigenous Potential in the United Kingdom, Newcastle upon Tyne 1979  
(GB)

HANAPPE, Paul, The Mobilisation of the Indigenous Potential, A Regional Policy Strategy, National Report for France, Paris 1979  
(F)

MATTHIESEN, Peter, The Mobilisation of the Indigenous Potential, A Regional Policy Strategy, Herlev 1979  
(DK)

O'FARRELL, Patrick, The Mobilisation of Indigenous Potential, A regional Policy Strategy, A National Report for Ireland, Cardiff, 1979  
(IR)

PALASTHY, Thomas, The Mobilisation of the Indigenous Potential, A National Report for Belgium and Luxembourg, Louvain-la-Neuve 1979  
(B/L)

VAN DUIJN, Jaap, Mobilisation of the Indigenous Potential, A National Report for the Netherlands, Hamilton, 1979  
(N)

**Preface**

In July 1979, the Commission of the European Communities asked the International Institute of Management (Science Center Berlin) to investigate in a feasibility study

- interregional differences in the technological innovation and diffusion process, and
- to develop strategies to promote the indigenous innovation potential of lagging regions.

Basic evidence to substantiate regional differences in the innovation potential was collected in a series of national reports listed in the beginning of this study. The evidence has been presented in a condensed form in the chapters 1-3 of this study. In chapter 4 information is given about existing regional policy reactions to regional innovation gaps. Chapter 5 presents a number of policy strategies and instrument proposals to improve innovation bottlenecks in lagging regions.

This feasibility study has not been able to look at innovation and technology problems of any specific problem region. More detailed studies will be needed to evaluate the comparative advantages and disadvantages of individual regions in the technological adjustment process and to develop region specific policy concepts.

<u>Table of Contents</u>		<u>page</u>
	Conclusions	1* - 22*
0.	Introduction	1
0.1	Basic Hypotheses	1
0.2	Levels of Analysis	2
0.3	Structure of Report	4a
1.	Regional Disparities and the Economic Development of the 1970's	5
1.1	The Changing Macro-Economic and Regional Development	5
1.1.1	France	5
1.1.2	Italy	7
1.1.3	Germany	9
1.1.4	Netherlands	13
1.1.5	Denmark	14
1.1.6	Ireland	15
1.1.7	Great Britain	15
1.2	Effects of Macro-Economic Changes on Regional Policy Effectiveness	16
1.2.1	France	16
1.2.2	Italy	17
1.2.3	Germany	18
1.2.4	Netherlands	18
1.2.5	Denmark	18
1.2.6	Ireland	19
1.2.7	Great Britain	19
2.	Interregional Difference in Innovation and Diffusion Performance - Direct Evidence	21
2.2	Great Britain: The Newcastle Study on the Regional Distribution of Significant British Industrial Innovations	21
2.3	Diffusion Studies: Canada and Germany	22
2.4	Interregional Distribution of Patents - Germany and Denmark	24
2.5	Summary	24
3.	Factors Affecting the Interregional Differences of the Innovation and Adaptation Potential - Circumstantial Evidence	25
3.1	The Localisation of Research and Development Functions	26
3.1.1	Great Britain	28
3.1.2	Italy	29

<u>Table of Contents</u> (continued)		<u>page</u>
3.1.3	Denmark	30
3.1.4	Ireland	30
3.1.5	France	31
3.1.6	Netherlands	32
3.2	The Localisation of General Headquarter Functions	33
3.2.1	Great Britain	37
3.2.2	Italy	38
3.2.3	Denmark	39
3.2.4	Ireland	39
3.2.5	France	40
3.2.6	Germany	41
3.2.7	Netherlands	41
3.3	Localisation of Business Services and External Contact Network of Firms	47
3.3.1	Great Britain	50
3.3.2	Italy	50
3.3.3	Denmark	51
3.3.4	Ireland	51
3.3.5	France	52
3.4	Size of Firms: the issue of Small and Medium Sized Enterprises	53
3.4.1	Bottleneck Factors Influencing the Innovation and Diffusion Potential of SME's	59
3.4.2	The role of SME's in their respective regional and national economic system	61
3.4.2.1	Great Britain	61
3.4.2.2	Italy	65
3.4.2.3	Denmark	65
3.4.2.4	Ireland	66
3.4.2.5	France	66
3.4.2.6	Germany	68
3.4.2.7	Netherlands	69
3.5	Ownership of firms: The issue of large multi-plant firms and external control	70
3.5.1	Great Britain	72
3.5.2	Italy	74
3.5.3	Denmark	75

<u>Table of contents</u> (continued)	<u>page</u>
3.5.4 Ireland	75
3.5.5 Germany	76
3.5.6 France	77
3.5.7 Netherlands	77
3.6 Productivity	77
3.6.1 Great Britain	78
3.6.2 Italy	78
3.7 Human Capital as a Determinant of the Regional Disparities	79
3.7.1 The Qualitative Polarization of Employment	79
3.7.2 The Qualification Issue in the Tertiary Sector	82
4. Present Policy Reactions in the EC Member-States	86
4.1 Great Britain: A Framework for an Innovation Oriented Regional Policy	87
4.2 Italy: Present Policy Reactions and Potential Policy Strategies	89
4.2.1 Innovation and Technology Policies	90
4.2.2 Industrial Policy	91
4.2.3 Regional Policy	91
4.3 Denmark	92
4.4 Ireland: Present Policy Reactions and Potential Policy Strategies	94
4.4.1 Traditional Regional Instruments	94
4.4.2 Innovation and Technology Policies	94
4.4.3 Small and Medium-Sized Firm Policies	96
4.6 Germany	98
4.6.1 General Remarks	98
4.6.2 Characteristics of the National Industrial Policy	98
4.7 Netherlands	102
4.7.1 Present Policy Situation	102
4.7.2 Potential Policy Strategies	103
5. Policy Implications	106
5.1 General Remarks	106
5.2 Policy Options	107
5.3 A Regional Typology	110
5.4 A Potential Policy Strategy: Policy Criteria	113

<u>Table of contents (continued)</u>		<u>page</u>
5.5	EC Policy Measures: Proposals	118
5.5.1	Reorientation of Regional Investment Incentives (ERDF)	118
5.5.1.1	Human Capital Criteria	119
5.5.1.2	Innovation Criteria	121
5.5.2	Human Capital Assistance	124
5.5.2.1	R&D or Management Personnel Subsidies	124
5.5.2.2	Training in New Technologies	125
5.5.2.3	Trainee Programmes	126
5.5.3	Improvement of Regional Information and Consultancy Infrastructure	127
5.5.3.1	Practicable Initiatives of the European Commission in the Establishment of Innovation Centres	129
5.5.3.2	The Function of Polytechnical Schools	131
5.5.4.	Promotion of Venture Capital	133
5.5.5.	Technology-Specific Assistance to Industry	135
5.5.6.	Controlling the Process of Functional Concentration	137

## C O N C L U S I O N S

### I. Introduction

- (1) In April 1979, the Commission of the European Communities asked the Science Centre Berlin (WZB) to investigate in a feasibility study the problem of
  - interregional differences in the technological innovation and diffusion process, and
  - to develop strategies to promote the indigenous innovation potential of lagging regions.
  
- (2) The study was to concentrate on the following issues:
  - To what extent do the changing macro-economic circumstances and technological development affect the determinants of, and barriers to, regional growth, especially of lagging regions, what is the role of innovation and technology diffusion?
  - How can the regional innovation potential be properly defined?
  - What are the main locational and intra-firm barriers to the innovation process? To what extent do they differ as between regions?
  - Can we define a typology of regions according to the elements promoting and preventing technological progress and innovation?

### II. Changing Macro-Economic and Technological Circumstances and Their Impact on Regional Growth Patterns

- (1) The drastic reduction in (manufacturing) employment is only the most important indicator of changing macro-economic conditions in Western industrialised countries. And while there are few, if any, "fully employed" regions in the EC at the beginning of the 1980s, the process of employment contraction seems to have hit some traditional problem regions (peripheral as well as highly industrialised and urbanised) much harder than other EC regions.



(2) The changing macro-economic trends are due to significant shifts on the demand and supply side, each of which is likely to have serious effects on the economic development of the Community's lagging regions.

- On the demand side, it is particularly the tendency towards saturation in domestic demand for (durable) consumer goods in industrial nations, especially for highly standardised products for mass consumption. Regions supplying these types of products are keenly feeling the changing structure of demand.

- On the supply side, it is above all a group of factors related to technological progress and to the changing international division of labour which can be made responsible for the decrease in employment in the industrial sectors of highly developed nations.

In the recent decade growing production capacities for mass-produced goods developed not only in industrialised countries, but increasingly in low-labour-cost countries. This competitive pressure from the Third World was reinforced by rising living standards and environmental requirements in industrialised countries which increased wage levels and production cost. Again, traditional problem regions with mass-production oriented industries and product mix seem to suffer most from this competitive pressure. The only way to gain access to new, and to consolidate traditional, markets and to cut costs or reduce the impact of inflation on input prices was through technological progress.

(3) Due to the changing international division of labour and the growing competition between industrialised countries, the high technological quality of products and the technological level of the production process, of automation and energy use, of communication and organisation become crucial factors.

However, from the early 1970s onward, investment into process innovation seem to have played an increasing role. The substitution

of capital for labour is more pronounced than ever. Investment effects capital deepening rather than broadening and aims at rationalisation and replacement rather than at expansion. Firms attempt to compensate for rising wage costs by a corresponding increase in productivity. Investment may still raise capacity, but not manufacturing employment.

- (4) This development has negative effects on the competitive position of many peripheral regions of the Community. They find themselves in a two-sided competition game. Firstly, their traditional comparative advantages over the most advanced agglomerated regions - lower labour, real-estate, and environmental costs - have been devaluated by the developing countries. Secondly, in the race for technological and organisational modernisation of the production structure they are probably disadvantaged vis-à-vis some of the highly innovative and productive metropolitan regions.
- (5) Many studies show that even under present economic conditions negative employment effects of process innovations, rationalisation and productivity increase are being compensated by the positive employment effects of final product innovation. This process, however, has a regional dimension. There is evidence that not only the modernisation of production technology (process innovations) occurs with some time lag in (peripheral) problem regions, but that the product-innovation-induced job creation process shows similar spatial patterns. This pattern will be reinforced by developments of specific technologies (e.g. micro-electronics).

### III. The Decisive Role of the Indigenous Innovation Potential of Regions. Definitional Problems

- (1) The success of regional policy in the 1960s was strongly associated with stimulating movement to the assisted areas. Mobility of firms to assisted areas, however, is particularly dependent upon the demand for additional production capacities (expansion investment).

This demand transfer from the non-assisted and particularly from the agglomerated regions was the basis for regional policy success during the '60s. Since the turning point of the economy in the early '70s firm mobility and the chances for demand transfer have been drastically reduced. Regional policy, therefore, has to direct itself toward the indigenous potential of problem regions.

- (2) In the widest sense, indigenous potential would include the physical and environmental resources, the genius and energy of people, the urban structure, the accumulated man-made capital etc. In view of the macro-economic conditions described above for the present period (chapter II) the term can be defined in a narrower sense as regional innovation potential.
- (3) The regional innovation potential which under present conditions represents the decisive bottleneck factor of regional development and an important leverage point for regional policies, is difficult to define in the absence of an adequate theory of regional growth.

The innovation and adaptation potential of a region is defined here 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.

- (4) Correspondingly the viability of certain regions to participate in the innovation and structural change process is determined by functional deficiencies of the economic structure of these regions in the areas of
- dispositive activities of collection and processing of information
  - planning and decision making
  - technical development (product and process innovation, R&D) and product design
  - market search and marketing organisation
  - management and financing.

- (5) Functional deficiencies of regions can be caused by a variety of structural characteristics of the individual firms, namely
- lack of headquarters of large multiregional corporations,
  - high share of production units (branch plants),
  - high share of smaller firms serving only local markets,
  - high share of subcontractors supplying a single customer with low-technology parts,
  - low share of firms in sectors or subsectors with a high level of technical progress.

It is important to notice that the future of individual industrial regions is now probably more dependent than formerly on the quality and characteristics of individual firms or types of firms and establishments, rather than on the presence or absence of individual industries. This is due to the fact that intra-sectoral change has become just as important as inter-sectoral change, that the technological progress operates much more through types of products and markets on to regions than through sectors in their crude definition of standard industrial classifications.

- (6) The second aspect of the functional weakness of problem regions concerns the lack of those environmental conditions necessary to effectively perform headquarters functions and to support the generation, implementation and adoption of innovations (innovation and diffusion process), e.g.
- degree of labour market diversification and availability of high professional qualifications,
  - density and diversity of information and communication systems, namely
    - \* availability of banking institutions willing to finance innovative projects of small firms on the basis of long-term technological or commercial prospects and of human capital and management quality rather than on existing assets and past performance,
    - \* availability of business services including technical, managerial, and marketing services,

- \* information linkages between the industrial and the science complex
- availability of social systems to absorb technological and structural change (e.g. labour-management relations, professional training systems, integrative function of business organisations).

It is important to notice that the required complexity and flexibility of the locational environment is to some extent identical with what has often been called "agglomeration economies". The specific tasks which the environment has to perform in the process of structural change and technological advance does, however, imply that many highly urbanised locations lack the environmental characteristics listed above.

- (7) In summary, the functional deficiencies can be reduced to the following four aspects
- qualified personnel (human capital) including entrepreneurial potential,
  - information and communication aspects,
  - availability of risk capital,
  - flexible social and organisational structures.

Deficiencies can arise on the supply side (environment) as well as on the demand side (firms). In addition, the weakness of firms can be influenced by the weakness of the environment and vice versa.

- (8) The attempt to define more clearly the term "regional innovation potential" is so far no more than a framework of argument.

It is neither supported by a fully developed theory of regional growth, nor by sufficient empirical evidence, nor does it propose a macro-statistical measurement system or a full set of micro-methodologies to test the hypotheses put forward within the scenario on regional innovation. More work will have to be done on all four levels.

IV. Evidence of Interregional Differences in Innovation and Diffusion Performance

(1) Direct evidence of interregional differences in innovation performance is very limited. In the strictest sense, the identification of regional innovation performance would require to measure on an interregional basis

- the share of output per region in new products or produced by new production technologies.

Studies taking this route do not exist at present due to conceptual and statistical problems.

(2) Empirical research, however, reveals a spatial concentration of technological innovation, considerable time lags in the spatial diffusion of innovations and marked interregional differences with respect to the generation of patents.

- A British study shows that the propensity to innovate in plants with under 100 employees is nearly 2.5 times higher in the South East and West Midlands than in regions covering most of the UK assisted areas.
- Technology diffusion studies show that in Canada peripheral regions suffer from diffusion time lags for major process innovation of up to 8 years in relation to the leading region for each innovation. In Germany, a study of the spatial diffusion of textile technologies found that 6 years after the first commercial application of certain new technologies, 60 % of all potential adoptors in non-assisted areas had implemented the innovation, while the corresponding figure for assisted regions was only 11 %.
- Interregional differences regarding the generation of patents were reported by a German study showing that standardised for number of firms in assisted and non-assisted regions the number of patents is 4 times higher in the non-assisted regions. A

Danish study reports that the number of patents per inhabitants is four times higher in the Copenhagen Metropolitan Region than in the rural and small town regions.

- (3) Given the complete lack of data in official statistical systems on the innovation performance of individual regions, it is difficult to establish on an empirical basis that there is a specific spatial component in the process of innovation and diffusion. The research reported above gives but a first hint that interregional differences exist. However, it shows neither specific patterns nor does it indicate causes.
- (4) The lack of existing statistical indicators and data to measure directly regional innovation performance can be compensated to a very limited extent by information related to factors relevant for the innovation and diffusion process. The factors selected are
- Localisation of R&D functions
  - Localisation of general headquarters functions
  - Localisation of business services and external contact networks of firms;
  - Size of firm: special function of small and medium-sized firms;
  - Ownership of firms: the significance of external control;
  - Regional productivity differentials;
  - Human capital.

The existence of regional disparities in the distribution of these factors does not necessarily imply that there are actual differences in regional performance in the innovation or in the diffusion process. While each of these factors is relevant for the innovation and diffusion process, as will be explained thereafter, they cover only some of the characteristics which, according to the definition given above, determine the regional innovation potential (c.f. chapter III 3. - 7.). The purpose of looking at the regional distribution of these input-factors is only to support the hypothesis gained from theoretical considerations and limited empirical evidence, that the innovation performance varies regionally. The factors investigated were selected for this analysis because at least some regional data could be obtained within the limited context of this project.

- (5) For the first three factors the data show a high concentration of public and private R&D activities, general headquarters functions and business services in the large agglomerations of the Community. It is important to notice that this uneven distribution of innovation-related activities cannot be explained by industrial structure, i.e. by a correspondent uneven spatial distribution of highly innovative industries.

The significance of the spatial concentration of these factors is that there exists a spatial difference in the

quality, variety and density of labour markets  
and information systems in the field of scientific,  
technological, managerial and market knowledge

This is likely to affect not only the innovation process in a narrow sense, but also the diffusion process. Technology diffusion studies mentioned earlier have suggested the hypothesis that diffusion time lags of assisted regions depend to some extent on the complexity of the innovation to be adopted. This means that the spatial bias will apply more to product and managerial innovations than to process innovations, because product innovations normally imply technological and market risks while managerial innovations tend to affect the whole firm instead of only a part of the operative functions, as in the case of "simple process" innovations. This spatial bias seems to work particularly against smaller firms in peripheral regions which cannot rely on complex internal labour and information markets, but have to have an easy access to contact systems and qualified labour (including a large variety of business services and part time personnel) when changing their product mix or internal organisation.

- (6a) The issue of small and medium-sized firms is of particular importance since they play a particular role as
- Suppliers of jobs in many of the peripheral assisted areas of the Community as well as
  - Potential sources of innovations in highly urbanised regions dominated by large enterprises with bureaucratic structures and traditional production programmes.



The issue of small and medium-sized firms is also particularly complicated since existing empirical studies show that

- Only a small share of small and medium-sized firms can be said to be technology-based and innovative, and that on the other hand
- Small firms tend to be more flexible and innovative than large corporations by virtue of a climate more suited to competitiveness, entrepreneurship and creativity. This is said to be the reason why those regions in the Western World known as centres of innovation and technical progress have a high share of small dynamic firms and a spirit of entrepreneurship.

(6b) Theoretical considerations and empirical research seem to suggest that

- A high share of small firms can be an indicator of a high level of entrepreneurship, flexibility and creativity of a region.
- On the other hand, smaller firms seem to depend much more than large corporations on the quality of regional contact networks, diversified labour markets, business services etc.
- The potential flexibility and innovativeness of smaller firms may therefore depend on the complexity and quality of their environment, to which the degree of urbanisation, the presence of headquarters and of business services can contribute.
- It is therefore not firm size alone, but the potentiality of smaller firms in a rich environment which produces highly positive results in terms of technological and commercial dynamism of small firms and of the rate of new firm formation.

(6c) Defining, as we have done, the regional innovation potential in terms of the regions functional complexity or functional deficiencies, does imply that the autonomy or dependency of small firms plays an important role.

The function of subcontractors or suppliers which often constitute a large share of a region's industrial texture, is therefore of considerable weight. While in legal terms they do not form a part of a larger enterprise, they pose special problems in functional terms. Their production often depends on technical norms provided

by their dominant customer and their market and product search is often limited by this dominant customer orientation.

There is, however, evidence from Japan, Germany and other highly industrialised countries that whole industries (e.g. the Japanese automobile industry), individual high-technology corporations (e.g. Bosch) and individual governments (e.g. the state governments of Hessen or Baden-Württemberg) undertake specific action to decrease the dependency of individual subcontractors and/or to strengthen specifically the role of subcontractors as suppliers of technological innovations and talents. Industrial research as well as national or regional economic planning and policy has so far paid little attention to the important, though ambiguous, role of subcontractors.

- (7) A related problem is the issue of external control. Firms or plants in peripheral regions may be externally controlled by multi-national/multi-regional corporations. Such control may be the result either of takeover and acquisition or of setting up a new plant. The degree of external control may be up to 80 % of manufacturing employment in some assisted regions of the Community. It increases in periods of progressive concentration. Empirical studies show that disparities in the regional level of employment qualification in general and in R&D, marketing and highly specialised tertiary activities are explained by external control. Mergers and takeovers often lead to an additional spatial concentration of entrepreneurial and highly qualified activities. While there is empirical evidence that the productivity of externally controlled firms/plants may be higher than in indigenous companies (caused by a higher rate of adoption of process and organisational innovations), external control has a negative effect on the indigenous sector in that it reduces the quality and diversity of local labour markets and information flows, in short, the functional complexity of a region.
- (8) While human capital and labour qualification (including entrepreneurial qualities) are among the factors most intimately

associated with technical progress and structural adaptability there is little empirical research on an interregional basis. There are serious conceptual problems (qualification in terms of training or of job complexity) which limit the quality of existing statistical data. Presently available studies, however, show a relatively perfect coincidence between the level of training and the regional hierarchy with depressed regions having the least qualified manpower. Similar patterns are shown for the spatial qualification of jobs with some notable exceptions from this spatial correspondence of training and job qualification levels.

- (9) While a detailed definition of the regional innovation potential and its determinants has been given above (c.f. III 3 - 7), the problems of measurement have not yet been solved. More theoretical work and empirical testing of hypotheses will be needed, problems of availability and comparability of statistical data will have to be solved, country by country.<sup>1)</sup> Even for the economic factors determining the innovation potential of a region, the official statistical systems provide only a limited amount of data. A large part of the relevant information will have to be obtained through special regional studies.

Recent technology studies in Germany and Great Britain have emphasised the overriding importance of social and socio-cultural factors for the technological modernisation process.<sup>2)</sup> The crucial element is the availability of social systems to absorb technological and structural change (e.g. labour-management relations, intra-firm planning and decision-making systems, educational and training systems). The studies developed a detailed indicator system to be used for quantitative analysis and forecasting. However, the indicator system has been developed for industry studies and would need an adaptation to the regional level.

---

<sup>1)</sup> The development of a statistical indicator system has recently been started by the German Ministry of Regional Planning and Housing.

<sup>2)</sup> PROGNOSE/Mackintosh, Technical Progress: Its Impact upon the Economy and Labour Market, Basle/Luton 1979.

V. Policy Implications : Regional Typology and General Criteria

- (1) The final objection of a policy to develop the regional innovation potential is not altogether clear.
- Given the assumption that the leverage point of such a policy is the indigenous potential of regions, the policy must be considered to be a means of developing every region according to its potential.
  - This must not necessarily imply that it is also a means of reducing disparities between regions. Depending on how it is being designed, it may do no more than compensate national technology policies which seem to work in favour of those highly urbanised regions which already have a highly developed innovation potential.
  - Even if it is not the aim of such a policy to develop a "technological profile" for each region, its minimum objective should be to reduce those barriers to innovation and technology diffusion which have a distinct regional or locational dimension. This may mean different things in a different spatial context.
- (2) The present state of empirical research does not allow to classify the regions of the European Community according to the existing level of technological advance and to the most serious barriers to technological progress.

As a first approach to adapt a regional innovation strategy to differing regional needs, a regional typology is proposed. The typology distinguishes between four types of regions:

1. Highly urbanised regions characterised by traditional heavy industry, e.g. coal and steel or shipbuilding regions such as the German Ruhr, Lorraine, West-Central Scotland.
2. Peripheral, less urbanised problem regions with an industrial sector which is largely externally controlled, e.g. Scotland, Mezzogiorno.
3. Peripheral problem regions characterized by locally-based small and medium-sized independent or subcontracting firms, e.g. the Toulouse area, Upper Franconia.
4. Agricultural problem regions without industrial base.

The first type group of regions enjoys high centrality and agglomeration size as well as a high degree of industrial and technological experience. However, the labour and information markets are homogeneous rather than diversified due to monostructure. The main barrier to structural change seems to be the "petrification" of social and industrial structures due to the dominance of large organisations (firms, unions, cities, banks etc.) and the lack of a favourable environment and business services for small and innovative firms, for creativity and experiments. These regions need redevelopment, not only development. They need a restoration of their earlier function as centres of organisational and technological innovation. Given the size of the problem, regional policy is usually too weak, while national industrial policies tend to reinforce the existing size structure.

The second group of regions suffer from peripheral location, lack of density and diversity of labour markets and information systems and, above all, lack of entrepreneurial potential and of industrial functions necessary for structural and technological modernisation due to external control.

The third group of regions possess at least a locally-based sector of autonomous small firms which could provide the entrepreneurial potential necessary for adopting new production technologies, developing new products and markets and responding to government stimuli. These regions, however, just as the second group, will never become centres of innovation. The task is rather to speed up the adoption and diffusion of new technologies, to modernise the product mix and to compensate for the loss of old markets by developing new market potential.

The fourth group poses a totally different problem. Apart from improving agricultural production, there are only two routes open for indigenous development: food industry based on the local agricultural products or, in some cases, tourism. Both types of activities, however, require entrepreneurial potential which is often lacking in these regions. While technological progress in food industry is

considered to be rather slow, the formation of an industrial food production sector in an agricultural region is a major development step which requires social, organisational, managerial and technological innovation processes. Because of the complex and simultaneous nature of such a development, it is a particularly difficult task for regional policy.

(3) With this crude regional typology and its strategic implications in mind, some basic criteria for a regional innovation policy can be formulated:

1. In the large urbanised and highly industrialised problem regions the regional policy potential is usually too weak in terms of financial volume and institutional strength to manage industrial restructuring. Regional policy efforts in these regions should be concentrated on helping the small firm sector, namely new as well as existing technology-based firms. The emphasis is on "creators" of innovations and early adoptors.
2. In the peripheral problem regions small and medium-sized firms are the most important target group because of their entrepreneurial potential, their greater market adaptability and modest scale of operation.
3. The majority of smaller firms in peripheral locations cannot be considered as potential producers of new technologies and high technology products. The emphasis should therefore be on the acceleration of the diffusion process, on the modernisation of the existing production process and product mix rather than on research intensive innovation activities.
4. In this context, technology push policies and the supply of new scientific information is not a dominant element. The main aim should be to raise the desire of small firms to be informed, to increase their inquisitiveness and their propensity to draw upon the sources of information available to them and to develop their potential to manage organisational, technological and product change.

5. The main emphasis should therefore not be on financial incentives to capital formation, but the promotion of human capital (including entrepreneurial skills), information and communication systems (intra-firm and general infrastructure), business services and credit behaviour (risk capital, innovation project evaluation) of local banking institutions. The idea is to compensate for the lack of agglomeration advantages such as diversity of labour, information and financial markets.
6. Another important point is that technology consultancy systems had a tendency in the past to promote the diffusion of process innovations. They were productivity oriented, but neglected the development of new markets and products. Their activities led to rationalisation and replacement rather than to expansionary investment, with corresponding employment consequences. An innovation strategy for peripheral regions should therefore put a maximum emphasis on establishing linkages with new (export) markets, improve the market information and help small firms (often single product firms) with modernising the production programme. Innovating the production technology may be a means to this final objective.
7. Regional innovation policies should not exclude specific industrial sectors because they are said to be shrinking. The first point is that structural change due to increasing imports from developing countries and to intra-OECD trade has inter-sectoral as well as intra-sectoral aspects. The changing international division of labour affects all industrial sectors alike: in all sectors the comparative advantages for labour and raw material intensive production and standardised goods are shifting towards the developing countries. In all industrial sectors, however, there remain product groups for which EC locations still have comparative advantages. Secondly, the development of modern technology (flexible production technology) allows firms to move quickly from one product group to another, thereby even crossing sectoral lines. An important objective of a regional innovation policy should therefore be to increase the managerial and tech-

nological flexibility of existing firms, irrespective of sector.

8. On the institutional side, a regional innovation strategy requires a high level of decentralisation. This applies to the decisions on the proper mix of instruments for individual regions as well as to the implementation of individual policies. The need to decentralise is caused by the fact that innovation barriers vary from region to region and that the innovation process touches upon very sensitive internal characteristics of private firms thereby requiring a spatial and mental closeness between the firm and policy institutions. The latter reason also speaks in favour of intermediary agencies rather than public administrations implementing the various policies.



V II Policy Implications: Policy Measures

- (1) Since there is a widespread desire to continue the classic components of regional policy, especially incentives to investment, care must be taken that the investment aided by incentives is not biased towards capital-intensity or labour-intensity, but towards technology- and human-capital-intensity. The study therefore proposed human capital and innovation criteria. While national technology policies promote mainly R & D, engineering and design, as well as prototype development, technology-oriented investment incentives have an effect on the production phase and can thereby aid potential adoptors of new technologies.

Experience with technology oriented investment incentive shows that this type of incentive should be linked with technology and management consultancy services to be effective.

- (2) In order to reduce the shortage of human capital in problem regions, three different schemes are being proposed
- R & D and management personel subsidies to small firms which would avoid continuing salary subsidization
  - Vocational training programmes in new technologies. This is of particular importance since recent studies show that e.g. the main barriers to the diffusion of microelectronics are not related to hardware, but to software development and human capital. Peripheral problem regions are particularly deficient in this respect.
  - Trainee programmes for senior students and graduates of technical schools in small firms located in peripheral regions. These programmes are intended to effect a human capital transfer into problem regions and to strengthen the links between the industrial sector of these regions and the research complex.
- (3a) While the proposals put forward in sections 5.5.2-5.5.2.1 are intended to improve direct ERDF aids to firms, the main emphasis of

EC regional policy should be directed at the build-up of a modern institutional infrastructure to promote the innovation process.

There are three reasons for that:

- with the exception of risk capital, lack of investment capital is not the most important barrier to (technological) modernisation of the industrial sector in problem regions. Lack of market and technical information, of planning and management capability and of human capital weigh more heavily.
- Through the formation of a modern infrastructure the ERDF activities will have a much more lasting and widespread effect than through direct aids to firms.
- By creating an institutional infrastructure (consultancy and information services) regional policy can have an important effect on the implementation and rate of take up by problem regions of national R & D and technology policies, which generally work in favour of the most dynamic industrialized regions.
- The ERDF should concentrate on pilot projects and programmes, on the evaluation of these pilot projects and the dissemination of evaluation results in order to induce national and regional governments to develop a large number of initiatives in problem regions of the Community.

(3b) The Community can have an important function in stimulation national and regional governments to set up a system of innovation centers (private companies of consultants or semipublic agencies) in problem regions. The Community has in fact taken certain initiatives in the "quota-free" section of the ERDF. This report takes the view that there should be a hierarchy of objectives for these activities:

- procurement of market information
- organisation and management consultancy
- technology transfer.

This hierarchy of objectives should be followed in order to avoid that the modernisation of production technology will be undertaken for an outdated mix of products.

EC activities could assist

- studies identifying those assisted regions in the EC where the organization of public, semi-public and private business services is still very deficient;
- financial aid for the planning and setting-up (initial investment) of innovation and management service centres in the most deficient regions;
- organizing an exchange of information between regions with similar economic structures on problems of technology transfer and innovation; and
- offering aid for technical installations in these centres which should be available in all peripheral regions such as easy-to-use computer terminals giving access to international data bases, or by subsidizing initial personnel costs necessary to adapt these technical installations to the needs of local firms.

(3c) The report proposes to make a maximum effort to link polytechnical schools (subuniversity level) located in problem regions to small and medium sized firms of these regions, since university level research institutes tend to concentrate on long-term scientific research rather than on short-term applied research, to cooperate with large corporations rather than with small firms and to "export" their research results nationally and internationally rather than orient themselves toward their local environment. The EC could stimulate experimental programmes in the following fields:

- Trainee programmes (o.f. section VII 2)
- Special research units, teaching programmes and consultancy services aimed at the specific organisational and technical needs of small firms
- Polytechnical schools could be stimulated to develop (in cooperation with industry) teaching programmes for vocational schools focusing on new technologies.

- (3d) While access to capital markets is still a general problem for small firms in certain regions and periods, availability of risk capital it has remained a major bottleneck for the innovation and adjustment process.

Special venture capital institutions at a national or sub-national level have not been very effective in terms of regional policy objectives. The EC should therefore study whether

- the local and regional banking sector in problem regions could be made more receptive to the special problems of innovation in small firms. The reluctance to finance innovative and therefore risky projects stems from the credit behaviour of commercial banks which base credit worthiness on assets and past performance rather than on long-term prospects (technical and commercial) of projects and on human capital and management quality of the innovator. One way of improving the situation is the financing of risk evaluation studies proposed by the EC.

- (4) The authors of this study have been extremely reluctant to recommend to the EC the promotion of specific technologies by direct subsidization of individual industrial projects.

The EC however is urged to discuss with national governments specific technology promotion programmes for peripheral regions in two technological fields:

- microelectronics
- information technologies

The reason for this recommendation is:

- The Community as well as national governments have taken important measures for the promotion of these two technologies which constitute a decisive element of technological progress in almost all industries. The effects of these policy measures are likely to be primarily felt in the dynamic and highly urban-

zed regions. In peripheral regions the level of receptiveness and the availability of technical and software personnel are much lower. The danger is therefore imminent, that peripheral regions fall quickly behind in these two technologies in the field of production technologies and industrial products as well as infrastructure installations.

- (5) A difficult policy problem seems to evolve from the increasing spatial separation of headquarters and routine functions between national core regions and peripheral areas. External control of peripheral regions seems to increase due to acquisition activities of large corporations. Corresponding losses of entrepreneurial and R&D functions in provincial locations have a negative effect on the regional innovation potential. These negative effects are difficult to prevent. Regional policy motives have so far not been an element of merger control. This measure would be difficult to use as an instrument for the control of headquarters relocation, since the relocation may not come but years after acquisition. Improving the technical and managerial quality of small firms may increase the resistance against take-over activities of large corporation. At the same time it may make small firms a more interesting case for acquisition.

A more promising approach may be through incentives (e.g. R & D personnel incentives) for large corporations to decentralise or maintain certain headquarters functions in peripheral problem regions. In some instances it may be possible to link research institutions of provincial conurbations specifically to locally-based firms and thereby to induce potential acquirers to maintain the close relationship and exploit the specialized location advantage for a decentralized headquarters activity.

In principle, however, regional policy seems to be in a difficult position to stop the essentially nonspatial process of industrial concentration for regional motives.

O.                    Introduction

The title of this project reflects the view, argued in the report, that problem regions will in the future have to look for their salvation more to the resources which lie within themselves than they have done in the past; that the flow of enterprise and investment coming to them from elsewhere - which has been the principal means by which regional policy has hitherto operated - is no longer to be relied upon. The call is therefore for the mobilisation of the indigenous potential of these problem regions. In its widest sense indigenous potential would include their physical and environmental resources, the genius and energies of their peoples, and the accumulated man-made capital. The treatment of indigenous potential in such a wide sense has, however, been beyond the possibilities of this project which, in practice, has confined itself to that aspect concerned with the generation of innovation in the techno-economic process and with the adoption of such innovations.

O.1                    Basic Hypotheses

Our interest in the central theme of this project grew out of the results of two international research projects concerning the effectiveness of existing regional incentive and disincentive policies. From these studies it became evident that the potential of existing regional policy instruments has been increasingly affected by the reduction in global growth and by the acceleration of structural change due to technological change and readjustments of the international division of labour. Given the lower level of interregional mobility of capital during recent years, firms already present in the assisted regions (indigenous potential) take on much greater importance as points of departure for regional policy strategies, far more than was the case during the period of problem free growth during the 1960's. But not only mobility has been reduced in recent years. Investment aimed at expansion capacity has diminished too, and this seems to be related to a shrinkage of the market potential of West European economies. We finally observe that due to the increasing capital intensity of manufacturing, new investment, even where it occurs on a satisfactory scale, creates fewer jobs than it did in the 1960's.

In this situation the competitive position of many problem regions becomes a serious point for discussion. To the extent that the comparative advantage of Western Europe moves towards quality standards, and then to types of production and service which are human-capital, technology-, and information-intensive, the more the peripheral regions of the EC, which have hitherto based their competitive strength on cost advantages, will suffer from the new situation. This situation may, in fact, be characterised by a dilemma for many peripheral problem regions. On the one hand, the costs of labour, real estate and environment - which are lower than they are in the large agglomerations - no longer count in competition with developing countries. On the other hand, peripheral regions may have only a small chance of competing with the dynamic agglomerations in areas of human capital and technology-intensive and innovative production and services.

If one attempts under these circumstances to prevent an increase in regional disparities, two routes are open:

- either further to promote the mobility of standardised production into those European peripheral regions with the greatest cost advantages - a method which would require even higher subsidies or protective tariffs and would therefore not seem to be a feasible option,
- or to equip the present assisted areas for technological change and structural adjustment.

The starting point for the second strategy are those factors which determine the ability of a region to produce or to quickly adopt innovations (product and process innovations). Those regions will profit from structural change which are able either to compensate for the loss of old markets through the building up of new market potential, or which can prevent that loss through technological change in production. In this process the regional innovation and adaptation potential will become the decisive bottleneck factor and an important leverage point for regional policies.

#### 0.2. Definition of Regional Innovation Potential

The innovation and adaptation potential of a region is defined here 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.

Correspondingly the inability of certain regions to participate in the innovation and structural change process is determined by functional deficiencies of the economic structure of these regions in the areas of

- dispositive activities of collection and processing of information
- planning and decision making
- technical development (product and process innovation, R&D) and product design
- market search and marketing organisation
- management and financing.

Functional deficiencies of regions can be caused by a variety of structural characteristics of the individual firms, namely

- lack of headquarters of large multiregional corporations,
- high share of production units (branch plants), without headquarters functions
- high share of smaller firms serving only local markets,
- high share of subcontractors supplying a single customer, with low-technology parts,
- low share of firms in sectors or subsectors with a high level of technical progress.

It is important to notice that the future of individual industrial regions is now probably more dependent than formerly on the quality and characteristics of individual firms or types of firms and establishments, rather than on the presence or absence of individual industries. This is due to the fact that intra-sectoral change has become just as important as inter-sectoral change, that the technological progress operates much more through types of products and markets on the regions than through sectors in their crude definition of standard industrial classifications.

The second aspect of the functional weakness of problem regions concerns the lack of those environmental conditions necessary to effectively perform headquarters functions and to support the generation, implementation and adoption of innovations (innovation and diffusion process), e.g.

- degree of labour market diversification and availability of high professional qualifications,
- density and diversity of information and communication systems, namely



- availability of banking institutions willing to finance innovative projects of small firms on the basis of long-term technological or commercial prospects and of human capital and management quality rather than on existing assets and past performance,
- availability of business services including technical, managerial, and marketing services,
- information linkages between the industrial and the science complex
- availability of social systems to absorb technological and structural change (è.g. labour-management relations, professional training systems, integrative function of business organisations).

It is important to notice that the required complexity and flexibility of the locational environment is to some extent identical with what has often been called "agglomeration economies", the specific tasks which the environment has to perform in the process of structural change and technological advance does, however, imply that many highly urbanised locations lack the environmental characteristics listed above.

In summary, the functional deficiencies can be reduced to the following four aspects

- qualified personnel (human capital) including entrepreneurial potential
- information and communication aspects,
- availability of risk capital,
- flexible social and organisational structures.

Deficiencies can arise on the supply side (environment) as well as on the demand side (firms). In addition, the weakness of firms can be influenced by the weakness of the environment and vice versa.

The attempt to define more clearly the term "regional innovation potential" is sofar no more than a framework of argument.

It is neither supported by a fully developed theory of regional growth,

nor by sufficient empirical evidence, nor does it propose a macro-statistical measurement system or a full set of micro-methodologies to the hypotheses put forward within the scenario on regional innovation. More work will have to be done on all four levels.

### 0.3 Structure of Report

In the following sections we start with the question of whether the early 1970's can be considered as a turning point for region trends and regional policy effectiveness (section 1). We then turn to an examination of studies which give direct evidence of interregional differences in innovation or diffusion performance (section 2). In a third chapter we present evidence of interregional differences in innovation firm characteristics and circumstantial evidence of innovative characteristics of the local environment of firms (section 3). In the final chapters present policy reactions and a framework for a regional innovation policy will be discussed (sections 4 and 5).

1. Regional Disparities and the Economic Development of the 1970's

The purpose of this section is trying to answer the question, whether the seventies actually represent a turning point for the regional problems and policies in the EC countries, and, if they do, to what extent.

Generally speaking, and according to the information from the different countries, the seventies seem to be a rather important turning point, which we are going to define country by country in the following pages.

1.1 The Changing Macro-Economic and Regional Development

As a general trend, and as far as the traditional economic indicators (such as regional income, or infrastructure) are concerned, there was during the sixties a certain decrease in the regional disparities, which continued, to some extent, during the seventies. But, as far as employment is concerned, the regional problems got rather worse since the early seventies.

Another point, which is common to many of the EC countries, is the emergence of new problem areas, for instance in the centre of many of the major conurbations. Conversely, but much more rarely, some non-core regions could better face the crisis as expected.

1.1.1 France

Most of the information we have for France is based on a recent study (by LEO and PHILIPPE, 1979) whose central question is whether industrial mobility obeys to the same laws during periods of growth and of economic slowdown. The evolution of industrial structure in each region between 1969 and 1973 was compared to the one between 1973 and 1976. Thus, they seem to consider 1973 as the real turning point. This seems to be true

at least for the elements they were studying.

They drew the following conclusions:

- a) Firstly the changes are sectorial. The variations in the impact on regions come as a by-product, as the result of the differences in the regional industrial texture.
- b) The recession affects almost all branches - all of them lose jobs between 1973 and 1976, with the exceptions of professional services, electronic equipment, music records and instruments. Only a few sectors such as organic chemistry, industrial electrical equipment, elements for aircrafts and, quite surprisingly, synthetic textiles, resist rather well the slowdown.
- c) The regional effects of the slowdown on employment and on investment are contrasted. The regions which appeared to be highly attractive during the growth period do still attract investment but not employment anymore. The regions attracting capital-intensive industries, such as Provence Côte d'Azur, Alsace, Haute Normandie, still get a good flow of new investment, but without any significant increase in employment, while the regions where less capital-intensive industries developed during the growth phase do not get any additional investments.
- d) Between 1969 and 1973, there was a rather strong tendency for regional industrial structures to come closer towards the national average and regional specialization was thereby reduced during this growth phase. Since 1973, this tendency was sharply reversed, so that in 1976 some regions are now more specialised than they were in 1969.
- e) During the growth period, fairly positive adaptation was proceeding in French industry, which was becoming more and more fitted to the expected structure of the world market. Since 1973, this trend has also been stopped by the slowdown.

So it appears quite clearly that the slowdown of the seventies

(which more precisely seems to have affected the French regional system since 1973) has not led only to quantitative effects in all types of regions, but also to qualitative changes in interregional structure.

#### 1.1.2 Italy

In Italy, the most important fact which appears during the seventies, is the emergence of the so called "third Italy"

- a) Generally speaking, according to the available statistical data the problems of the peripheral regions have not decreased, but have even increased to some extent. For example, although since 1971 there has been a drastic reduction of migration from the South to the North (as well as of external migration), this has not been caused by an improvement of the economic conditions of the Mezzogiorno. If, between 1971 and 1977, the employment rates shows almost the same relative increase (40%) in both Southern and Northern regions, this does not signify an improved capacity of the Mezzogiorno economy to absorb at least a part of the increase in labour supply deriving from the reduction in out-migration. A lot of emigrants coming back from the North (as well as from abroad) because of the recession did not even start to look for a job in the South, simply because they were discouraged by the bad economic climate, and they form a "hidden" unemployment which does not appear in statistics. As far as industrial employment is concerned, and despite its weaker industrial structure, the South performed rather better than any of the other areas, due to its capacity to attract new firms in sectors of medium and high capital intensity. Conversely, traditional sectors like textile, clothing, food and agriculture, wood and furniture, performed worse than in the rest of Italy.

The process of industrial diffusion that characterized the South in the period 1970/1976 was not sufficient to reduce economic disparities between its region and the most prosperous ones. However, the type of industrial structure we have just described, with a growing modern sector producing intermediate and final investment goods, and a declining traditional sector, producing consumption

goods for the local market, does not seem to be able to ensure self-sustained economic growth in the South. In other words, if the Mezzogiorno today is to some extent better off than in the past (although disparities in income per capita still remain), it is at the same time more dependent on Northern Italy.

- b) In any event, since some point in the earlier seventies, to speak of the regional problem in Italy in terms of a macro-spatial split between the well developed North and the depressed South tends more and more to give a wrong picture. As we pointed out at the beginning, it is in this respect that the seventies could really be seen as an important turning point.

The Eastern part of Italy, along the Adriatic axis, (and especially the central part of this axis), has shown, since the early seventies, its own patterns of regional development, based on strong entrepreneurship and on a network of small independent firms which are very innovative and dynamic and perform quite well. So, although this phenomenon does not yet appear in statistical data, there is some evidence that the development of these small firms (sometimes at the level of workshops) has changed the regional pattern in Italy, by establishing a third category of regions, and thereby qualifying the well-known macro-split between the North and the South.

1.1.3 Germany

In Germany, the turning point in economic development occurred in 1974/1975 as can be seen from the following Table:

Table 1:

I n d i c a t o r	1973	1974	1975	1976	1977
- GDP absolute, prices 1970 (milliard DM)	761.8	766.0	750.1	791.7	813.8
- Percentage of real increase in GDP, prices 1970	4.9	0.5	- 2.1	5.5	2.8
- Natural population change (in 1,000)	- 95.4	-101.1	-148.7	-130.3	-122.6
- Net migration balance (in 1,000)	+384.0	- 9.4	-199.2	- 72.2	+ 32.7
- Population of working age (in millions)	39.7	39.6	39.5	39.6	39.6
- Active population (in millions)	26.7	26.2	25.3	25.1	25.0
- Unemployed (in 1,000)	273	582	1,074	1,060	1,030
- Unemployment rate, percent- age (yearly average)	1.2	2.6	4.7	4.6	4.5

The interregional disparities in the quality of the social and economic infrastructure have been reduced in the seventies and the housing and environmental conditions are even superior in many of the problem regions, as shown in the following Table.

Table 2:

I n d i c a t o r	Deficient <sup>1)</sup> in infrastructure	Deficient in labour market conditions	Rest	Average Federal Republic
- Rent in DM per sq.m, 1972	2.76	2.76	3.12	2.98
- Rate of house-ownership in per cent, 1972	43.5	38.8	29.5	33.5
- Emission of sulphur-dioxide in kg/sq.km, 1972	17	45	49	43

The most important area in which interregional differences persist or even increase is the economic and labour market development. This has largely been due to the macro-economic problems in the seventies. The following Table gives some evidence of growing economic disparities.

(See Table 3):

1) The regional delineation employed here has been developed by the Federal Ministry of Spatial Planning, Housing and Construction. It is not co-existent with the so-called Assisted Areas eligible for regional incentives of the Federal and State Ministries of Economic Affairs (=GRW):

Area Classification	Inhabitants (in 1,000)	Density of population (inhabitants per sq.km)	GDP per capita of active population	Share of tertiary sector in GDP
	1975	1975	1974	(in per cent) 1974
- Deficient in infrastructure	14,288.7	144	14,011	46.8
- Deficient in labour market conditions	21,207.0	186	14,032	48.3
- Rest	35,066.4	354	17,390	49.2
- Federal Republic	61,992.3	249	16,005	48.3



Table 3:

Indicator	Deficient in infrastructure	Deficient in labour market conditions	Rest	Average for the Federal Republic
Monthly wage (DM) per industrial employee/worker				
- June 1970	1,132 = 100	1,169 = 100	1,283 = 100	1,243 = 100
- June 1976	2,003 = 176.94	2,091 = 178.87	2,322 = 180.98	2,231 = 179.48
Unemployment rate (average Jan./Sept.)				
- 1974	3.2	3.6	1.9	2.4
- 1977	5.9	6.2	4.0	4.8
	> 2.7	> 2.6	> 2.1	> 2.4

The economic and labour market problems have led to continuing emigration losses from peripheral regions. The active part of the population, and the younger age groups in particular have been affected by the drift of population from rural regions. (See Table 4)

Table 4:

Indicator	Deficient in infrastructure	Deficient in labour market conditions	Rest	Average for the Federal Republic
Migration balance per 1000 inhabitants				
- 1970	+5.1	+3.7	+13.0	+9.4
- 1976	-1.1	-1.2	- 1.2	-1.2
Internal migration balance of active population per 1000 inhabitants				
- Ø 1970/71	-0.7	-1.4	+ 1.0	±0
- Ø 1975/76	-0.5	-0.8	+ 0.5	±0
Internal migration balance of the age group of 18-25 yrs. per 1000 inhabitants				
- Ø 1975/76	-7.9	-8.5	+ 6.3	±0

Of particular importance has been, that since the middle of the seventies highly urbanized problem regions emerged more clearly than before. This applies to two different types of agglomerations. On the one hand there are dynamic metropolitan regions such as the Hamburg, Frankfurt or München, regions which, after many years of continuing growth, experienced high rates of unemployment and of population losses. However, in 1978 unemployment had disappeared again in these regions. As far as population losses are concerned, this was mainly due to low birth rates in the major cities and to outmigration from the city cores to the outer rings. Both factors were not related to the development of the economic structures in these regions. Due to their favourable economic texture, most of Germany's larger conurbations still attract the young and qualified part of the working population from the more peripheral regions.

An exception to this favourable development of the German agglomeration system have been the coal and steel regions Ruhr and Saar. Given their share of population, GDP and weight in the electoral system, they now seem to have become the most serious problem regions in Germany. High rates of unemployment and outmigration, which in this context can be considered as an export of unemployment, can be directly related to the inability of these regions to diversify the economic structure and to adapt it to the needs of the new international division of labour.

#### 1.1.4 Netherlands

As was the case in the Federal Republic of Germany, the turning point in the Netherlands seems to occur in 1974/1975.

The regional disparities in per capita income have decreased over time, and, although there are no income data available beyond 1974, it does not seem very likely that the trend towards equalization of regional per capita incomes will have been discontinued after 1974/1975. The impossibility under the Dutch system of agreeing to interregional differences when settling wages would be one reason for this unlikeliness. (Dutch social and economic policy would be another). But, while a tendency towards income equalization is noticeable, the absolute values of regional per capita income are still highest in the three western provinces, and lowest in the assisted areas.

As far as unemployment rates are concerned, regional disparities decreased until 1972. Since then they have increased again and the highest unemployment rates are recorded in the two main development areas - the Northern provinces and Limburg.

The seventies represent a turning point for investment activity. Statistics comparing the level of industrial investment in the years 1974/1977 with that of 1970/1973 show that the change was actually negative in three provinces in the West and South-West, with the negative rates in the Western agglomerations exceeding those of their respective provinces. One of the main reasons for this decline is the concentration in these maritime provinces of activities such as oil refineries, petrochemicals (Rijnmond) and steel (N-Holland) in which industries investment sharply decreased. Yet, if these sectors are not taken into account, growth rates in the non-western provinces still come out higher than those in the sea-oriented provinces. But this represents much more a deterioration of the position of the West rather than an improvement of the position of the assisted areas. Apparently the aggravation of unemployment in the assisted areas was not due to a relative lack of investment, but new investment creates fewer jobs than it did in the sixties.

Another important point is that, as far as both industrial investment and employment changes in manufacturing are concerned, the assisted areas

have performed rather better than the Western provinces since 1974. The period of stagnation that followed 1974 has not led to a greater decline in manufacturing employment in the assisted areas than elsewhere.

#### 1.1.5 Denmark

Generally speaking, regional development in the seventies in Denmark might be characterized, firstly, by a rather pronounced decentralization of population from the agglomerations to the more sparsely populated areas. Furthermore, the growth rate of the Copenhagen Metropolitan Region turned negative in 1973, and nowadays, the whole of Zealand is losing population, although the country as a whole shows a slight increase. Generally, the regions with a growth rate below the national average in the period 1965/1970 had a higher growth rate in the period 1970/1975, and vice versa.

As far as employment is concerned, we can see much the same tendency, i.e. a rather strong decentralization from the more densely populated regions towards the peripheral regions. These interregional developments are partly to be accounted for by inter-urban developments, in which context it is quite evident that appreciable decentralization has taken place in the seventies. All agglomerations have been losing employment shares and this trend is strongest at the top of the urban hierarchy. However, this decentralization has not been equal for all types of functions: generally speaking, one could say that the old regional problem of the fifties and the sixties, i.e. a general lack of jobs in the peripheral areas, has turned, in the seventies, into a more qualitative problem, i.e. a lack of highly qualified jobs in those areas.

In general, regional disparities in income for the same occupational groups decreased through the seventies. However, there is still a significant difference in average income levels, if agglomerations are compared with rural areas.

As far as unemployment rates are concerned, the very strong regional disparities of the fifties and the sixties have been reduced, but in a "negative" way, by unemployment in the agglomerations having increased

more in the seventies than was the case in the rural areas.

#### 1.1.6 Ireland

There are no income data available beyond 1973, but it is quite likely that the tendency to a reduction in income disparities between the East and the other regions has continued into the seventies. As an example of this reduction in disparities, it may be said that while income per capita in the East was 23% above the national average in 1969 and 70% greater than in the poorest region (Donegal), it was in 1973 17% above the national average and 50% greater than in the poorest region. Industrial expansion outside the East region has been a major factor explaining these reduced disparities, but changes in agricultural incomes, earnings from tourism and government transfer payments are also part of the explanation. These data on interregional income disparities need to be considered against the background of Ireland still having the lowest income per head amongst EC countries. As far as industrial employment is concerned, the East region has had a lower growth rate than the whole country since the early sixties: between 1966 and 1971 manufacturing employment in the East increased by 3.9% compared with 10.6% at national level. The effect of the 1974/1976 recession seems to have substantially exacerbated these trends, since the East and North-East regions recorded a net loss of 12.050 jobs between 1973 and 1977, while the rest of the country achieved a net increase of 13.950 jobs within the same period.

But, as far as employment in the service sector is concerned, there has been an inverse trend during the seventies: while the East region has recorded the greatest net decline in manufacturing employment, the service employment has concentrated and expanded more and more in the core region around Dublin.

#### 1.1.7 Great Britain

The beginning of the seventies can be considered as a turning point in Great Britain, partly because the movement of plants to Development Areas which formed the basis of the relatively successful regional policy of the sixties, fell away markedly. The most recent data (1975) suggest

that mobility has been at a much lower level than in the late sixties.

By creating new job opportunities in assisted areas the movement of industry in the sixties permitted the rapid run down of the traditional industries such as coal, shipbuilding, etc. without unacceptable levels of unemployment being reached. The problem in the seventies is the continuing decline of traditional industries (shipbuilding, steel coupled with a lack of movement, an inability to transfer government employment from the South, and constraints on public expenditure. Another point to be emphasized is the rather high number of closures in recent years of firms which had moved into the Development Areas not long before. They evidently did not take root well enough and could not successfully face the depressed economic climate.

As a general picture, recent data shows the eastern regions becoming more active, the West declining, and a further increasing concentration of headquarter and R & D functions in the South-East.

## 1.2 Effects of Macro-Economic Changes on Regional Policy Effectiveness

As shown in the preceding part of this chapter, the seventies do represent in general a turning point as far as regional development is concerned. It would be interesting to know the extent to which this has been due to the reduced effectiveness of regional policies and the extent to which it has been due to the generation of fresh problems, or the augmentation of old ones. We will try to answer this question briefly, country by country, in the present section.

### 1.2.1 France

The slowdown, which we described in the first part, affected French regional policies and behaviour alike. A lower propensity to invest in almost all industries might explain in a large measure the reduced effectiveness of regional incentives based on industrial investment. Additionally, however, the various crises led to changes in relative prices and many other economic features, in turn leading to changes in behaviour, and a search for new arrangements, often on wrong basis, as

quasi-permanent changes were made in the economic framework. Thus, it is not surprising that the attitudes of firms changed with respect to location and their responsiveness to the old regional policy instruments also changed. But there was no radical revision of French regional policy and awareness of the changing features of the regional problem, and of the need to approach that problem in a different manner, remained very limited.

### 1.2.2 Italy

The changing nature of the regional problem in Italy has been the focus of political debate since 1974, even before the new law for the Mezzogiorno (1976) was passed. Beside the reactions of the government, some other public or semi-public institutions (for instance, Chambers of Commerce) or even private ones (such as associations of industrialists) spontaneously decided to approach the regional problem on some different basis. The main reason explaining these new reactions is that, although the general opinion holds that the gradual installation of an industrial structure in the South can be partly attributed to the positive influence of regional policy, there are some doubts whether the existing policy can have the same importance in the future that it had in the past in the development of Mezzogiorno. First of all, because of the lower propensity to invest and lower industrial mobility, the amount of incentives granted by the Government (especially capital grants) started to slow down from 1975. - The situation is even more dramatic if we consider that the state holding sector, which was the most important investor in the Mezzogiorno during the period of active regional policy (1966/1971), reduced its investments drastically after 1972, despite a new law for the South attributing to state holding firms an even stronger role as a regional policy instrument. The second fact these doubts are based on is that almost all studies evaluating the effects of regional policies provide substantial evidence of the incapacity of these policies to affect investment decision of both multinational and multiregional firms.

Finally, in analysing the effect of regional policies, it has been pointed out that they are partly responsible for the present industrial structure of the Mezzogiorno (in terms of sectors and types of firm), one which has made this region less poor but more and more dependent, as we said in the first part of this section.

### 1.2.3 Germany

In Germany too the changes of the seventies have been translated into policy terms to some extent.

The German Federal Government as well as the different State Governments stressed in their Joint Regional Development Plan ("VIII, Rahmenplan der GRW") as well as in the Federal Spatial Plan ("Raumordnungsbericht"), in 1978, the impact of the international economic recession on spatial development. In the latter (Federal Spatial) Plan, the Federal Government forecasts considerable population losses in the peripheral regions, due to heavy job losses and consequent emigration, which cannot be offset by high birth rates, such as experienced in earlier periods. Job creation is, therefore, considered as the most important objective of regional policies in future years.

### 1.2.4 Netherlands

The consequences of the 1974/1975 recession on the effects of Dutch regional policies are clear. Due to the considerable decrease in the propensity to invest, the effectiveness of regional policy instruments has been sharply reduced, so that, from the commencement of the second half of the seventies, regional policy has had to adopt a totally defensive behaviour, i.e. the preservation of as many jobs as possible. But in fact there has been no radical change in Dutch regional policy. The general reaction of both the Dutch government and Dutch politicians, following the recession, has been to apply more, even much more, of the same. Rather than questioning the effectiveness of the old instruments, regional policy was "strengthened" by increasing the number of subsidized centres and by stepping up investment premiums.

### 1.2.5 Denmark

There has been no change in regional policy in Denmark in the seventies (and especially since 1973), however, since the general reduction of mobility has meant that the number of relocations and new branch openings has dropped, most regional incentives nowadays are given to extensions of (or reinvestments in) local manufacturing companies.



Generally speaking, there was no radical policy reaction in Denmark. The existing law was passed in 1972 and only very small changes in the delineation of the assisted areas have taken place since then .

#### 1.2.6 Ireland

The Irish Industrial programme has in the past relied heavily upon attracting mobile investment from abroad.

Nowadays the Irish Government is quite aware of the changing international environment which could have rather negative effects on Irish economic development. Although regional incentives have been quite effective in the past, the changing international division of labour, the slowdown in the expansion rate of world trade involving a reduction in demand for standard products, and increased competition from other countries for the diminishing stock of mobile international investment may pose increasing problems for the development of Ireland's peripheral regions in the future.

So the Industrial Plan for the 1978/1982 period aims to reduce the relative dependence upon overseas investment, by planning to generate 52% of the job approvals (around 75,000 jobs) from domestic sources (which include expansions by overseas plants in Ireland).

#### 1.2.7 Great Britain

Since the mid 1960's, there has been a lot of changes in U.K. regional policy.

The seventies began with a strong commitment to increasing economic activity in the Development areas. However, the power of two instruments, both important for an effective regional policy (IDC and investment grants), was reduced in late 1970, only to be reinstated two years later. The area covered by Regional Assistance expanded in 1972 but is to be considerably reduced according to the 1979 government proposals.

Expenditure on regional aid fell back in the early seventies but recovered to its earlier level by 1976. However, the subsequent abolition of REP

(Regional Employment Premium) and the proposed cuts over the next 3 years will reduce the total financial assistance available to the Development Areas and the general impact of Regional Policy. However, the economic recession has made the operation of tight IDC control impossible. As the same time the development of a sectorally based National Industrial Strategy by the 1974-79 Government seemed to conflict to some extent with Regional Policy. Generally speaking, a fundamental shift in policy now seems to be taking place and does not augur well for those industrialists more or less dependent on regional aid, though the Government clearly views the changes as part of a package intended to have a healthy influence on the economy as a whole.

2. Interregional Difference in Innovation and  
Diffusion Performance - Direct Evidence

2.1 Direct evidence of interregional difference in innovation and diffusion performance is lacking for most countries. Hard evidence is very difficult to come by. Relevant studies exist at the moment only in Great Britain, Canada and Germany. In the strictest sense, the identification of the innovation performance of regions would require to measure the share of output per region in new products or in products in the early phases of the produce life cycle. Studies taking this route do not exist at present and the outcome of a pilot study in Germany to prepare an adequate methodology using production statistics is not yet clear (LAUTERBACK, Wiesbaden: HLT, 1979).

2.2 Great Britain: The Newcastle Study on the Regional Distribution of Significant British Industrial Innovations.

2.2.1 Region Studies: OAKEY, THWAITES and NASH (1979) have examined the spatial distribution of 323 significant product innovations in Great Britain which they have chosen from the successful applicants to the Queens Award to Industry scheme and from the Data Bank of Important Innovations maintained by the Science Policy Research Unit, Sussex, from 1965 onwards. According to their analysis, there was a definite dominance of the South-east Metropolitan Region, with regard to innovation activity. The percentage of innovating firms in the South-east was considerably greater than one could have expected from the percentage of its industrial employment or the number of industrial firms. For an explanation of the dominance of the South-east, the sectoral composition of the regional industrial structure certainly plays an important role, as the authors demonstrate. It is, however, clear that the smaller firms (up to 100 employees) in the South-east and the West Midlands are clearly ahead of comparable firms in other regions. They have innovated two and a half times as frequently as firms in the assisted areas. Such a gap could not be established for large firms; within the multi-plant firms, nevertheless, it was evident that, where product innovations found their first commercial application outside the "inventor firm", this production

unit in a vast majority of cases was in the same region as the inventor firm. A further evaluation indicated that the largest part of the innovations (64%) was commercially developed in the innovating firm itself.

Even if it was impossible for the authors to undertake a deeper analysis because of the limited data, one can draw at least two plausible conclusions from this study: first, the innovative activity of regions appears to be dependent to a great extent on their indigenous activities, which are essentially determined by their respective industrial structures. An indication of this in any case is given by the high percentage of firms which have developed their own innovations and the low distance involved in the transfer of innovations in multi-plant firms. On the other hand, the innovativeness of small firms is clearly dependent on their respective regional environments, while large firms are less dependent on their locational environment.

2.2.2 The same study shows that of the 61 innovations developed on one side and transferred to another within the same company for production, only 16 cases involve the crossing of the boundaries of one of the economic planning regions. Since the South East is the most important source of innovations and innovation transfer, it is also the main beneficiary from its dominant role in this process.

### 2.3 Diffusion Studies: Canada and Germany.

A study by the Economic Council of Canada (MARTIN et al., 1979) analyses regional differences in the adoption quota of eight process innovations (e.g. basic oxygen furnaces and electric furnaces in the steel industry, special presses for paper manufacturing, various IBM computers) in five Canadian regions. The analysis to a great extent has been based upon aggregated data from official sources. Although this is justified by the difficult data situation for diffusion studies, it, nevertheless, precludes an exact definition of the group of potential adaptors as well as a detailed analysis of the particular characteristics of early or later adaptors. The authors are aware of these weaknesses and interpret their results cautiously. In the case of most technologies, there is a clear lead in adoption on the part of the Ontario region, which

also leads with regard to income, productivity and degree of urbanization. The average diffusion lag between adoption in the respective leading region for each of the eight individual innovations and adoptions in Ontario was 1.4 yr. By comparison, the peripherally located Atlantic region has an average lag of 6.9 yr; the other regions demonstrate average lags between 2.5 and 4 yr. This finding, which refers to the average diffusion of all eight technologies investigated, corresponds to the regional differences in the diffusion speed in the individual technologies. The authors note that in most cases, the lead on the part of Ontario rests on very different and, in fact, technology-specific determinants of spatial diffusion. In the case of the diffusion of computers, the regional industrial structure (sectoral and firm-size structure) and the presence of national administrative agencies were the leading determinants in diffusion speed. In the diffusion of oxygen steel processes, the distance from the most important Canadian market played the major role. Most of the causal factors for the various diffusion processes tended to favour Metropolitan Regions with central headquarters and service functions.

A German study (EWERS et al., 1979) which investigated among other things the distribution of tufting technology, found that from the date of the first application of this technology in Germany (1954-1955) up to the year 1961, 60% of the potential users in non-assisted regions had introduced this process innovation, while the diffusion rate in the assisted areas up to the same date amounted to only 11%. If one compares the adoption rates between assisted and non-assisted regions over time, there is a delay in the assisted regions amounting to an average of 4-5 yr. In the same study, a second method was used in order to show evidence for regional innovation differences. A regionalization of the official patent statistics for the mechanical-engineering sector shows that - if standardized for the number of firms as well as the number of employees in the assisted and non-assisted regions - the patent rates of the non-assisted regions were four times as high. Although data on firm size for assisted and non-assisted regions do not exist, the fact that the majority of firms in this sector are small and medium-sized leads us to expect no size-related distortion in the above results. Nevertheless, there remains that doubt which arises from the deficiencies of patents as indicators for innovation performance: not all patents lead to marketable innovations, and by no means all innovations are based on patented

inventions.

If one attempts to draw a tentative conclusion from the empirical evidence available on the link between innovation performance in firms and spatial structure, there appear clear indications that regional differences in innovation performance do exist, and that these cannot be fully explained in terms of sectoral or size structure. Nevertheless, the data base used in these analyses is still very imperfect with regard to the sectoral disaggregation and to the internal characteristics of the firm which must be taken into account in order to determine the relationship between spatial structure and innovation performance. The following section does not attempt to give such an answer, but, instead, simply sketches the framework which we feel relevant for further study of this question.

#### 2.4 Interregional Distribution of Patents - Germany and Denmark

Despite its many limitations as an indicator for innovation performance or potential, the regional distribution of patent generation has been studied for a limited field of technology (machinery goods) in Germany. Standardized for number of firms in assisted and non-assisted areas, the number of patents is 4 times higher in the non-assisted regions (German Report p.43). A similar study is reported for Denmark, where the number of patents per inhabitant in the Copenhagen Metropolitan Region is 3 times as high as in the rural and small town regions (Danish Report p.21). Given the problem of patent behaviour of different types of firms (small/large) and the fact that only the commercial application of a patent could lead to an innovation, we must be aware of the limitations of this type of indicator. It is rather an indicator of innovativeness than an indicator of the innovation performance or diffusion process.

#### 2.5 Summary

Given the scarcity of information on interregional differences in innovation performance, on geographical diffusion time lags or on the speed of changes in the product mix of different regions, we certainly cannot establish so far a strong case for a spatial dimension of the innovation and diffusion process in the member-states of the EC. The

information presented here is, however, interesting enough to justify the examination of further information and indicators which are rather related to the concept of "innovation potential" than to the innovation performance concept. We must, however, keep in mind that in a regional policy concept, information above determinants of innovative firm behaviour, be it intra-firm or "environmental" information, is most relevant to the extent that it can be applied to the problem of diffusion rather than innovation in a narrow sense.

3. Factors Affecting the Interregional Differences  
of the Innovation and Adaptation Potential  
- Circumstantial Evidence

The aim of this section is to analyse those factors which a priori might have a bearing on the innovation diffusion process at local level, and in general might limit the capacity of indigenous industrial potential to react to the changes of the general economic climate.

The existence of regional disparities in the spatial distribution of these factors does not necessarily imply that there are actual differences in regional performance both in the innovation and in the diffusion process. Hard evidence on this subject is very difficult to come by; at present in fact it is available only for Great Britain, Germany and Canada and is reported in Chapter 2.

According to the information included in the individual country studies the variety of factors relevant for the innovation diffusion issue may be gathered under seven main headings:

- Localization of research and development functions
- Localization of general headquarters functions
- Localization of business services and external contact networks of firms
- Size of firms: i.e. the issue of s.m.s firms
- Ownership of firms: the issue of external control
- Regional productivity differentials
- Human capital

To these factors might be added the different level of productivity shown by local firms in peripheral areas of some countries. This result in fact may be partly attributable to a failure to adopt the latest process innovation.

In the following pages all these aspects are analysed in detail country by country. It should be borne in mind, however, the different "quality" of the information available in the various reports. They vary from the findings of research testing the impact of these factors on the regional structure/development to the crude statistical representation of the phenomenon on regional level. This shortcoming has direct influence on the comparability of the evidence collected and to some extent reduces the possibility of drawing general conclusions about the impact of the different factors at European level. Within these limits, however, it is already possible to provide preliminary information about the relevance of the phenomenon in the European Community.

### 3.1 The Localisation of Research and Development Functions

According to the existing literature there appears to be a relationship between the level of R&D commitment and the growth of firms or industry, although the direction of causation is less clear and little explored (THWAITES 1978). Thus uneven spatial distribution of this function is likely to affect the regional performance, although a distinction should be made between local firms and firms externally controlled, i.e. firms that can benefit from the R&D functions carried out by their parents elsewhere.

In Table 1 preliminary results about the spatial distribution of R&D functions (in terms of employment, research centres and R&D grants) are listed for some of the EC countries.

Four countries, i.e. Great Britain, Italy, France and Denmark, clearly show in the years under consideration (roughly 1975-1977) an uneven regional distribution of R&D employment. The most striking figure refers to Italy, where only 2% of total public and private R&D employment (with the exclusion of Universities) is located in the Mezzogiorno. The concentration of R&D employment is extremely high even in the Paris Region and in the British



Table 1: Regional Distribution of R&D Functions in some EC Countries

Country	R&D Function	Year	Spatial Division	%
GB	employment	1977	South East	70
			Rest	30
I	employment	1975	North	98
			South	2
F	employment	1975	Paris Region	70
			Rest	30
DK	employment	1975	Copenhagen Metr. Region	40
			Rest	60
N	Research Centres	data	Randstad	58
			Rest	42
IR	R&D Grants	1977-	East Region	45
			1978	Rest

South East: in both cases it accounts for 70% of the total national. To some extent less severe seems to be the regional disparity in Denmark, here in fact Copenhagen Metropolitan Region accounts for 70% of the total national R&D employment (in terms of R&D expenses however, the concentration is higher, i.e. 72%). Netherlands and Ireland show a clear uneven distribution for R&D centres and R&D grants respectively, whereas for the other three countries no data are available on R&D activity on regional level. In the case of Ireland the East's share of R&D payment relative to its share of manufacturing employment would greatly increase by the exclusion from the data set of old indigenous Irish firms set up under tariff protection that characterize this region.

It is of interest to note that in the case of Great Britain and Italy the regional distribution of R&D employment is not explained by the analysis of industrial structure, i.e. the imbalance of assisted areas is not caused by an underrepresentation of industries characterized by high R&D intensity at national level. Although for the other countries this hypothesis has not been tested, there is at least evidence that R&D employment (or R&D centres and R&D grants) in the core regions is overrepresented with respect to the share of manufacturing employment.

### 3.1.1 Great Britain

The spatial distribution of R & D activities seems in Great Britain largely unbalanced. CRUM and GUDGIN (1977) found that the South-East contained some 17,000 jobs in research and development compared with only 3,300 in the Development areas, although research and development is not only carried out in head offices. They argue in fact that corporate research and development facilities are more often located in research and development laboratories which are either free-standing or attached to production sites. In either case, however, the choice of location is more likely to be the South-East than elsewhere in the country. BUSWELL and LEWIS (1970) found that nearly half of all detailed research establishments in 1958 were concentrated in the South East. (GB, ch. 3 - 3.4)

THWAITES (1978) tested the hypothesis that the relatively low level of research and development employment in the Northern region can be explained through an analysis of industrial structure. In other words the distribution of certain industries - such as Electronic Components which spend large amounts on research and development-was sought as an

explanation. However, industrial structure was found not to be a significant explanatory variable. Other factors like quality and density of information in the local area, ease of contacts both national and international, tradition and prestige, proximity to the head office - in the case of corporate research and development laboratories - seem to be the reasons for this location pattern (GB. Ch. 3 - 3.5).

### 3.1.2 Italy

The analysis of regional distribution of R & D activity in Italy has been carried out by distinguishing between public institutions and industrial firms, both public and private.

In 1975 only 15% of the total budget of public institutions undertaking R & D activities (with the exclusion of universities), was spent in the South. In terms of employment the situation was similar: 12% was located in the South and 88% in the North. It is of interest to note, however, the regional differential in terms of occupational groups: in relative terms, researchers are underrepresented in the Mezzogiorno whilst less qualified people are overrepresented (I.p.16, Tabs. 10-11).

Much more dramatic is the situation when we look at R & D functions in industrial corporations. In 1977 only 2% of total employment in R & D activity was located in the South. This figure however is the result of two components: state holding firms which located in the South roughly 7% of their R & D employment and private firms which, on the contrary, located in the South only 0.5% of total R & D employment (namely 154 people!) (I. p.15, Tab. 12).

No study has attempted to analyse the different location pattern of R & D activity in Italy. There is evidence, however, that even in this case industrial structure is not the only significant explanatory variable. If we compare data on ownership status of firms operating in the South with data on R & D employment at national level, we find that, whereas local firms operate mainly in sectors that employ few people in R & D activity, multiregional firms are concentrated in those

sectors characterised by very high employment in R&D activity.

This leads us to conclude that the low level of Research and Development employment in the Mezzogiorno can be attributed to two different factors:

- a) the concentration of local firms in sectors that in general devote little effort to such a function;
- b) the peculiar behaviour of multiregional firms; in fact although they operate in industries characterised by very high level of R&D employment at national level, they sharply discriminate between North (or abroad) and South as far as the location of this vital function is concerned (I, p.25).

It is of interest to note that multiregional firms in the South accounted for 56% of total employment in 1977 (I, tab 17).

### 3.1.3 Denmark

In Denmark the Copenhagen Metropolitan Region clearly dominates in the spatial distribution of Research and Development functions. In 1975, 72% of R&D expenses and 70% R&D personnel were concentrated in the Metropolitan Region of Copenhagen, although its share of total national manufacturing employment was only 35% (DK,p.20).

### 3.1.4 Ireland

No regional statistics covering R&D expenses personnel are available in Ireland. A crude indicator has been devised by examining the spatial allocation of payments under the IDA Product and Process Development Scheme for 1977 and 1978. The results show that traditional agricultural regions which contained 9.5% of national manufacturing employment in 1978 - received only 4.7% of the R&D grant payments. Conversely, the semi-industrial regions with 42.1% of national manufacturing employment received 50.2% of R&D grants in 1977-78. Firms in the core East region with 42% of total manufacturing employment were

allocated 45.1% of the R&D grants. This pattern is precisely as would be predicted a priori, except that it might have been expected that the East region would have accounted for an even higher proportion of R&D grants. The reason for this is that the East contains the highest proportion share of old indigenous Irish firm set up under tariff protection. Exclusion of such firms from the data set would greatly increase the East's share of R&D payments relative to its share of manufacturing employment. (IR. p. 9-10).

### 3.1.5 France

There is a rather strong imbalance in the spatial distribution of R&D activities in France. A DATAR - Report (published in 1976) shows that among the total R&D personnel which represent 200,000 persons (50,000 researchers and 150,000 technicians and administrative employees), about 70% are concentrated in the Parisian Region.

The study "TECHNOLOGIE ET AVENIR REGIONAL" (VALEYRE 1978) relates how, by a reverse of a previous, wholly centralized research policy, some efforts were made to establish some big Research Centres, such as the Research Centre for Telecommunications in the Bretagne, outside of Paris.

Indeed it did not result in technological independence for the regions, because those few big research centres maintained close relationships with the related bodies in Paris and had virtually no relationship at all with anybody in the region where they were located. There is still much polarisation of research in Paris, and the regional inequalities in accessibility to research results and innovation processes have not been reduced - although we could mention new proposals (Sept 79) by the COMITE INTERMINISTERIEL D'AMENAGEMENT DU TERRITOIRE to enable the decentralisation of industrial research means to small and medium sized firms, and to encourage the creation of new research centres in the province. We have no statistical data, but there is some evidence that some regions resist in a certain way the increasing R&D polarisation in Paris - these are the Rhone-Alpes region (with LYON and GRENOBLE), Provence Cote d'Azur, and to some extent the Alsace (mostly due to historical factors which always gave Alsace a rather strong urban network and allowed escape from the Parisian influence).

3.1.6 Netherlands

The data on the regional distribution of public and private R & D activities show their remarkable concentration in the Western Region (Randstad): 58.1% compared with 31.8%, 4.6%, 3.9% and 1.6% for the other regions (NL. p.12) respectively.

Concerning the amount of scientific publications, the discrepancy is even higher: 65.4% compared with 17.5%, 9.1% and 8.0% respectively.

VAN DUIJN (NL. p.11) emphasises, however, that concerning the regional innovation and adjustment potential there is no direct information available in terms of R & D firm data. He considers the above cited indicators as being proxies that very often are taken as substitutes for innovations. All of those R & D activities usually - though not always - precede the innovation act. They could be considered inputs to the innovation process. An increase in those activities then could be said to increase the innovation potential, just as an increase in the traditional input factors labour and capital could be said to increase potential output.

Regional differences in innovation potential could then arise from different levels and rates of growth of any of those variables. But always one would have to be aware of the limitations of the R & D/patent-type indicators. In a regional context they are neither necessary nor sufficient for regional innovation to occur.

If we again use population distribution as a bench mark on all variables, all regions outside the West are underrepresented, with the sole exception of (notably public) research centres in the East.

### 3.2 The Localization of General Headquarter Functions

Evidence suggests that a high proportion of innovations are initially stimulated by a recognised consumer need (PAVITT 1971, LANGRISH et al. 1972).

The internal information network of a firm is also extremely important, especially as far as the contacts between the R & D team and people working in the marketing division are concerned. These links are likely to be conditioned by the quality and the organization of the staff (CARTER-WILLIAMS 1958).

Moreover, evidence suggests that similar intra-firm characteristics are important to the rate and the level of imitation (THWAITES 1978).

Thus, either the centralization of these functions or the spatial differences in the quality of the internal information system of a firm (defined in terms of non production employees) is likely to affect the chances that successful innovation/early adoption might occur in assisted areas. According to the result of the project SAPPHO, the major differences between successful and unsuccessful firms in their attempts to innovate were found in the areas of marketing and market research (SAPPHO 1972).

If we look at the spatial distribution of head offices (see Table 2), we find that in six countries, namely Great Britain, Italy, France, Germany, Denmark and Netherlands the largest industrial (and non industrial) corporations locate their headquarters in the core regions. This general and, to some extent, obvious result however, needs some further comments.

The lowest disparity in terms of regional distribution of head offices is found in Germany, where almost all the headquarters of the largest corporations<sup>1)</sup> analysed are concentrated in core regions. This striking figure however may be qualified by pointing out two features:

- a) the core regions in these cases are the ten biggest agglomerations of Germany, well dispersed over the country,
- b) headquarter functions seem to be quite evenly distributed among these agglomerations.

---

1) The 100 largest firms of the industrial, 50 each of the banking, insurance and trade sectors have been analysed in this context (cf.p.42).

Table 2: Regional Distribution of Headquarter Functions in some EC Countries

Country	Headquarter Function	Year	Spatial Division	%
GB	head offices	1977	South East	62
	(largest UK manufacturing firms)		Rest	38
I	head offices	1975	North	65
	(largest It. corporations)		South	35
F	head offices	1976	Paris Region	78
	(largest manufacturing firms)		Rest	28
D	head offices	1976	10 largest agglomerations	= 100
	(largest corporations)		Rest	= 0
N	head offices	1974	Randstad	67
	(largest corporations)		Rest	33
DK	head offices	1975	Copenhagen Metr. Region	56
	(largest industrial companies)		Rest	44



Conversely in France, where the concentration in head office location is the highest, the Paris region alone accounts for some 78% of the total national share.

These general considerations concerning the impact of the urban structure on the localisation of specific headquarter functions are in part confirmed by the distribution over space of industrial non-production activities (see Table 3). Four countries, i.e. Great Britain, Italy, France and Denmark show a concentration of people working in these non-production functions in core region; even in this case the Paris Region accounts for the highest location quotient.

The relation between this type of functional centralisation and the strategy of large multiregional/multinational corporation has been directly tested in Great Britain, Denmark and Netherlands. It is interesting to point out that, although there was a general trend to decentralise low skilled employment and routine and production functions in the period under observation, specific aspects partly connected with the geographic size of the country should be taken into account for the future. As Jansen stated in his study for Netherlands (JANSEN 1979): "...considered from a company perspective, except for the North, the Netherlands as a whole may be considered to be 'one urban field'"; that is to say that Jansen, at least implicitly, doubts the usefulness of a policy aimed at establishing countervailing growth poles in peripheral regions of Netherlands through an innovation-oriented regional policy.

Table 3: Regional Distribution of Industrial Non-Production Activity in some EC Countries

Country	Industrial Non-Production Activity	Year	Spatial Division	Location Quotient
GB	office employment	1971	South East	1.27
			Rest	-
I	managerial and clerical (active population)	1971	North	1.38
			South	0.55
DK	white collar employment	1975	Copenhagen Metr. Region	1.22
			Rest	0.88
F	white collar employment	date	Paris Region	1.9
		n.a.	Rest	-

### 3.2.1 Great Britain

The results of empirical research reveal the extent to which head office and production functions have become geographically separated in the United Kingdom. PARSONS (1972) for example, using a sample of 69 large manufacturing corporations, analysed the regional distribution of their control and operating units. London and the South East contained 74% of the head offices sampled, compared with only 28% of the operating units. Conversely, the Northern Region contained some 4% of the corporations operating units, but only 1% of the group head offices (GB, ch. 3-2.4).

Analysis using the Times 1000 directory to show the location of the headquarters of the largest UK manufacturing firms and the change of their location over time has been carried out by GODDARD and SMITH (1978) for the period 1972 to 1977. In 1977 some 62% of head offices were located in the South Eastern Region with 52% being within Greater London. The South East also showed the largest increases in head offices over the 1972-1977 period. All other regions, with the exception of Scotland, Northern Ireland and the South West, showed actual declines in head offices, particularly the North West (- 1.5%) and the East Midlands (- 1.0%) (GB. ch. 3-2.5).

The uneven distribution of office employment between regions in the UK has been well documented over recent years. (BURROWS, 1973; NORTHERN REGION STRATEGY TEAM, 1976). In particular, concern has been expressed at the concentration of office employees - and especially those in higher managerial and professional grades - into the South Eastern region.

This has left the peripheral regions, including the development areas of the country, with relatively few office employees concentrated into more routine grades of employment. In 1971, for example, the South East contained 47% of national office employment compared with only 37% of the nation's total employment. Moreover, while 32% of all South Eastern employees were employed in office occupations in 1971, only 19% were employed in office jobs in Wales and the Northern Regions (GB, ch.3-3.1).

3.2.2 Italy

No study has attempted to test whether head office and production functions have become geographically separated in Italy. However, if we look at the location of the headquarters of the Italian corporations we find an absolute primacy of Northern regions with respect to Mezzogiorno. In 1975 some 65% of head offices were located in the North, with 22% in central Italy and only 12% in the South. Moreover, when considering the location of the twenty Italian firms among the 500 largest industrial corporations in Europe, we find that they have their head offices in the four big agglomerations, i.e. Milan (10), Rome (5), Turin (2) and Genoa (2), except for one that is located in Trieste. (I. p.42).

The analysis of regional distribution of active population in industrial sector by occupational groups shows something similar to the British situation. Managerial and clerical functions are overrepresented only in North Western regions (the location quotient is 1.38) whereas in all the other regions the figures are always below the expected values. On the opposite side, manual workers are overrepresented in the South (the location quotient is 1.05), whereas in all the other regions they are less than the expected values (although in this case the corresponding location quotients are quite close to 1.) (I.p.33).

### 3.2.3 Denmark

While the manufacturing industry as a whole has decentralised very strongly, it is important to notice that there is a different development for blue collar workers than for white collar workers. The latter are over-represented in the agglomerations, and up to 1973 this over-representation has become even stronger while the relative distribution seems to have reached a more stable level since then (DK, p.5).

Another aspect of the spatial distribution of headquarters functions is highlighted by a study analysing the development of higher managerial occupations in 1957-1970 period. The administrative unit of a company was divided into three levels defined as: special superior occupations (decision making, planning, negotiations, research) general superior occupations (service to special superior occupations, head of affairs, control) and routine office jobs (service to the general and superior functions). (DK. p.12). Both these general superior occupations and the special superior occupations show an enormous growth with respect to total employment (four and half times that of total employment the former and six times that of total employment the latter). Moreover regional disparities in the distribution of special superior occupations showed a trend to increase even more in the period 1960-70 (DK, p.11 and p. 16).

### 3.2.4 Ireland

There are no data available to show the extent to which there are interregional variations in the degree of decentralisation of headquarters functions. However, the fact that development areas contain a higher proportion of externally controlled branch plants of smaller size than non development areas combined with their greater remoteness from centres of decision making and external economies suggests that, on average, a branch plant in the peripheral D.A is more likely to have a smaller range of headquarter functions than one in N.D.A. (IR, p.12).

### 3.2.5 France

There is a very strong disparity between the Parisian Region (or Ile de France) and the rest of the country as shown in the VALEYRE study "LA POLARISATION DE L'EMPLOI DANS L'ESPACE FRANCAIS". 388 of the 500 biggest French firms had their headquarters located in the Ile de France in 1976, (1958 = 375), while, conversely, the 10 most peripheral regions together had less than 4% of the whole (= 19) (Grand-Ouest, Sud-Ouest, Massif Central, Languedoc, Corse). The second range regions had 65 headquarters and the Bassin Parisien, 27. The recent evolution still indicates the same polarisation (which increased in the 20 past years), while only the Bassin Parisien presented an improvement in that viewpoint.

The difference in the spatial distribution between white collar and blue collar workers can be shown in a parallel drawn between some characteristic departments and compared with the national average. Compared with the national percentage (69%), there is an over-representation of workers both in very peripheral and depressed regions with an agricultural tradition, such as the DORDOGNE - in the South West - (85%), and regions of old declining industrialisation such as the North (76%), while white collar workers are over-represented in Paris and the "first ring" departments of the Parisian region, and to some extent, in second range regions (METROPOLES D'EQUILIBRE).

The study of A. LIPIETZ, "LA DIMENSION REGIONALE DU DEVELOPPEMENT DU TERTIAIRE" (1978) shows that, within the "internal tertiary", one can make a distinction between, on the one hand, the internal tertiary which is linked to the labour process and on the other hand, the internal tertiary which is linked to the circulation of capital. While the first one is rather well developed in certain regions (and not only in the Parisian Region) such as the regions around the METROPOLES D'EQUILIBRE - but not in old and declining industrial regions such as the North - the latter remains concentrated almost only in the Parisian Region, and more precisely, in Paris.

### 3.2.6 Germany

The regional distribution of headquarters of the largest firms in the manufacturing (100), banking (50), insurance (50) and distribution/transportation (50) sectors is presented on the maps 1-4. These maps give evidence for three different characteristics of the German spatial system.

(1) The 250 headquarters are well distributed over space, concentrating, however, in the 10 largest agglomerations of Germany.

(2) Between these ten agglomerations there seems to be a division of functions in terms of the sectoral concentration of headquarters in the different metropolitan regions.

(3) Despite the polycentric characteristics of the system of headquarters in Germany, only a very few of them are located in the German assisted areas. The split between central and peripheral (mainly assisted) areas is just as sharp as in the other European countries.

### 3.2.7 Netherlands

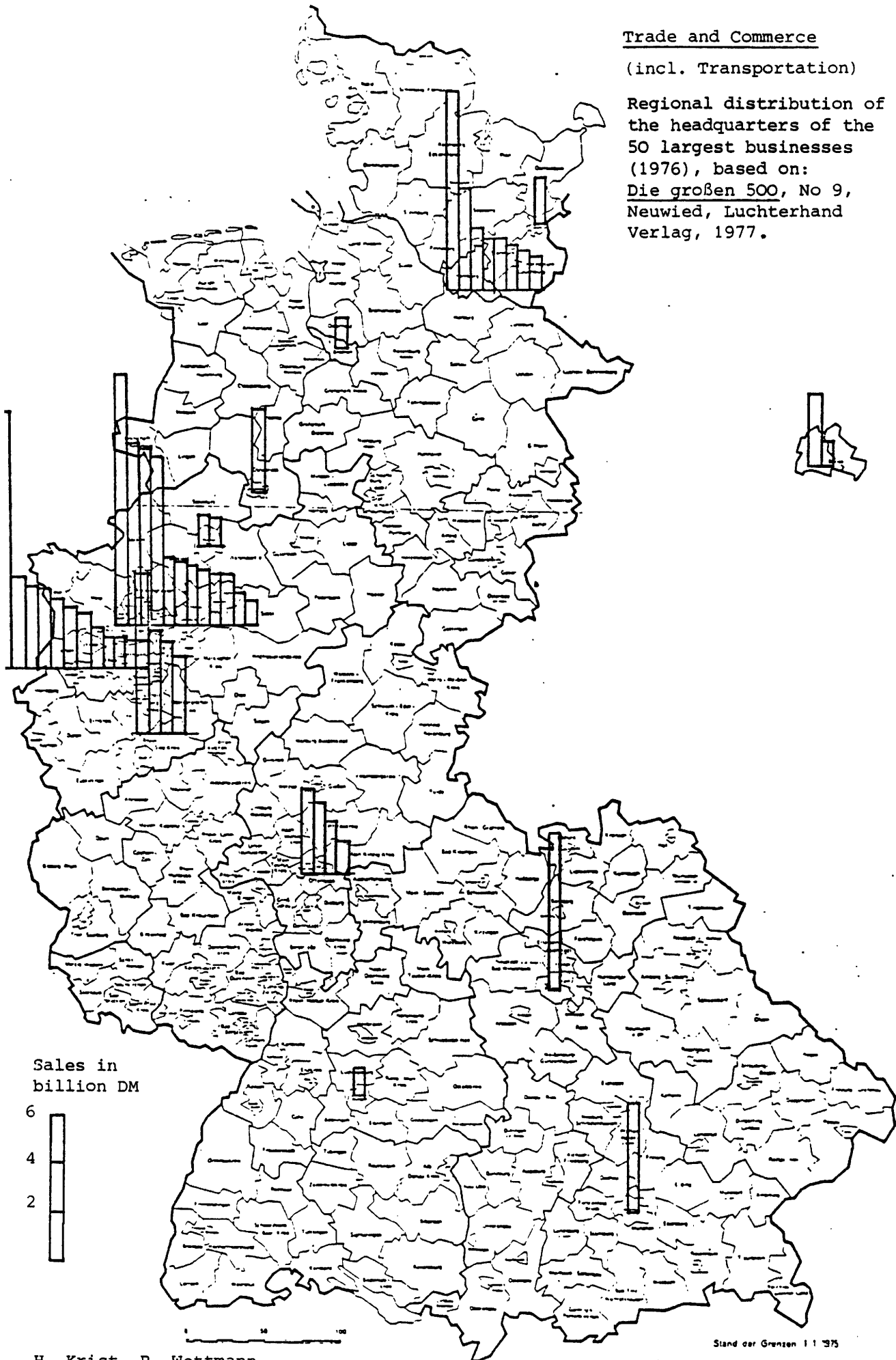
In the Netherlands head-offices are concentrated in a few large agglomerations. The Netherlands are therefore no exception to the common European pattern in which peripheral regions are lacking clusters of management centres. This feature usually is put forward to explain the allegedly lower innovation and adjustment potential of these regions.

Two-thirds of the 264 largest corporations have headquarters in the Randstad. For non-industrial corporations the distribution is even more uneven: there the Randstad-share is 84%.

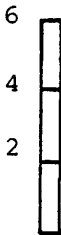
Conversely the assisted areas can claim only very few headquarter locations. Also, those headquarters that can be found outside the Randstad and the Randstad-oriented part of the Netherlands are not spatially-concentrated enough to form centres of management. In fact, the Netherlands as a whole would only contain three such centres: Amsterdam, Rotterdam and Den Haag. Outside the West, only Twente, Arnhem/Nijmegen and Eindhoven could be considered 'partial' management centres - (NL, p.18).

Trade and Commerce  
(incl. Transportation)

Regional distribution of  
the headquarters of the  
50 largest businesses  
(1976), based on:  
Die großen 500, No 9,  
Neuwied, Luchterhand  
Verlag, 1977.



Sales in  
billion DM



0 50 100

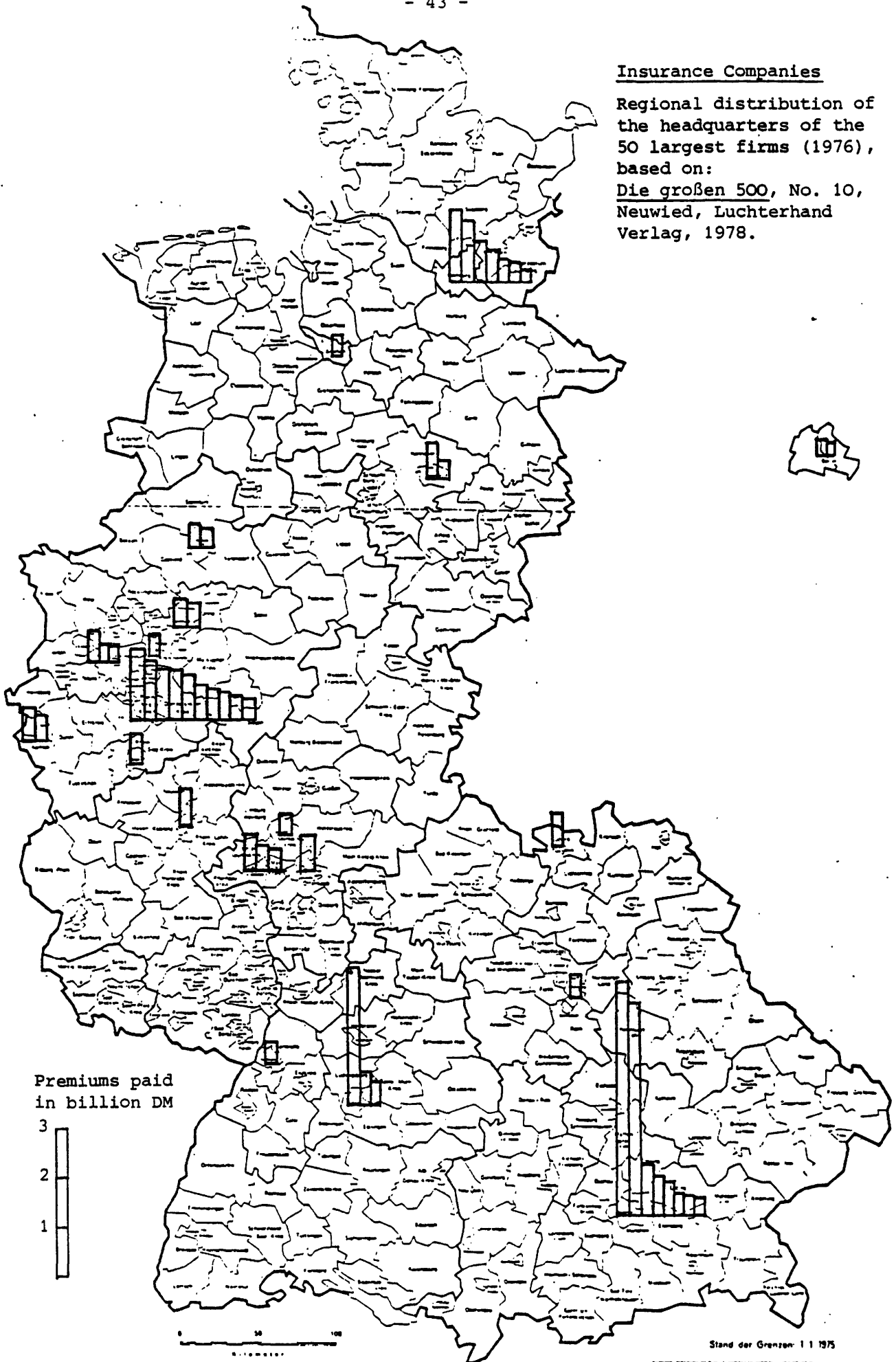
Stand der Grenzen 1.1.1975



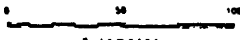
Insurance Companies

Regional distribution of the headquarters of the 50 largest firms (1976), based on:

Die großen 500, No. 10, Neuwied, Luchterhand Verlag, 1978.



Premiums paid  
in billion DM

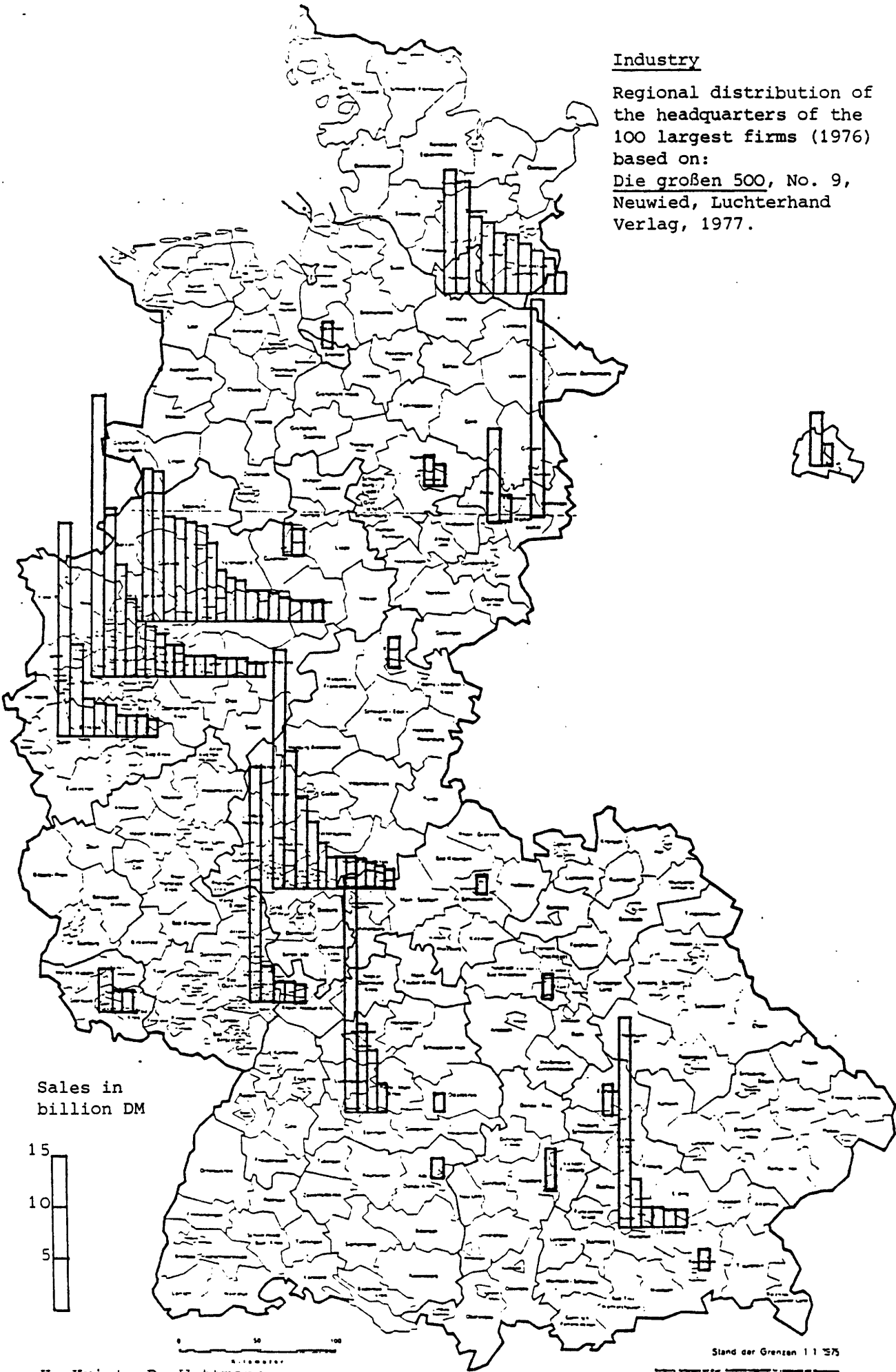


Stand der Grenzen | | 1975

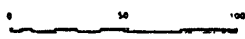
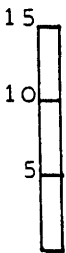
Industry

Regional distribution of  
the headquarters of the  
100 largest firms (1976)  
based on:

Die großen 500, No. 9,  
Neuwied, Luchterhand  
Verlag, 1977.



Sales in  
billion DM



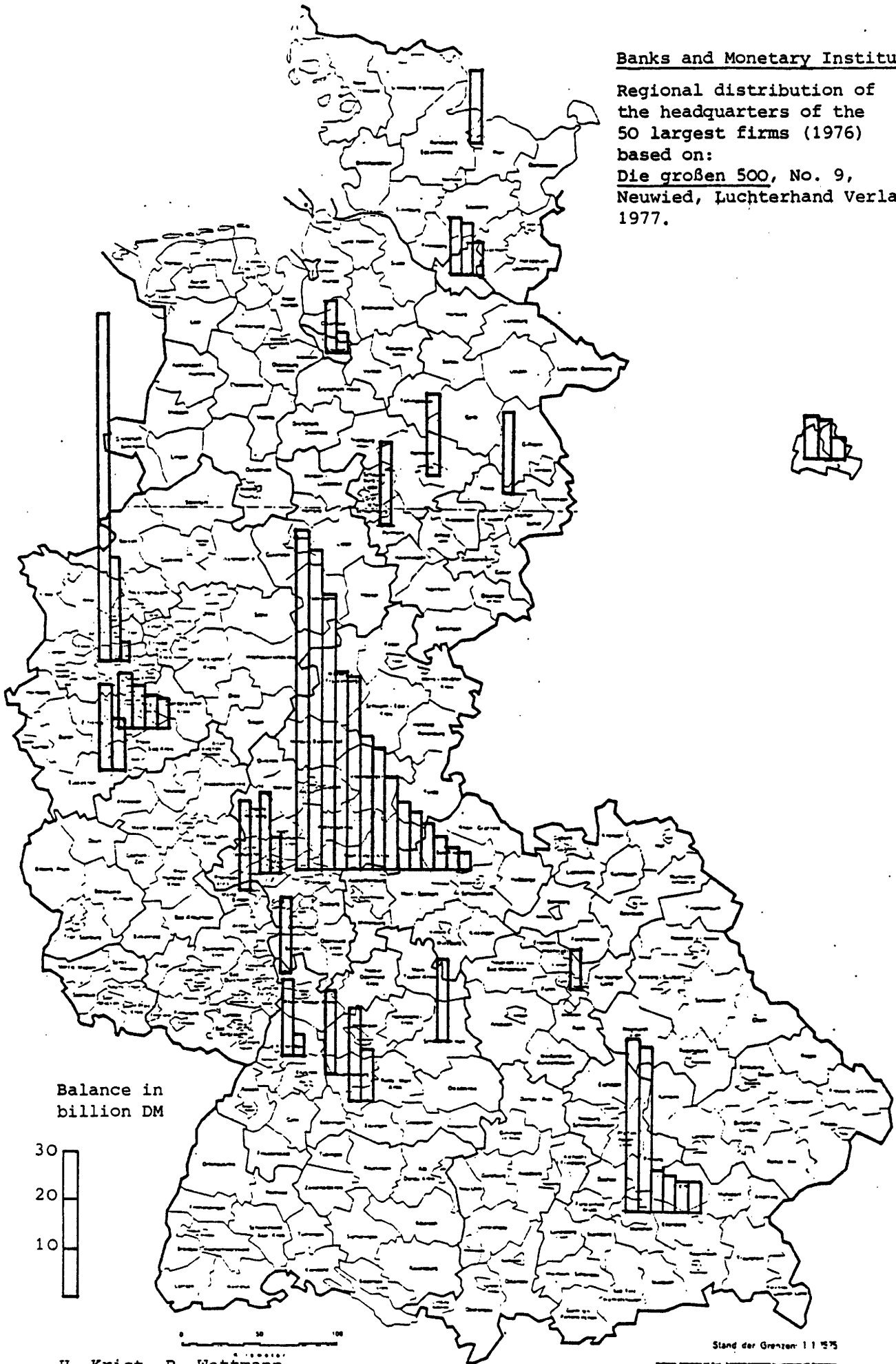
Stand der Grenzen 1.1.75

Banks and Monetary Institutes

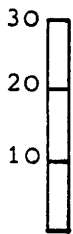
Regional distribution of  
the headquarters of the  
50 largest firms (1976)

based on:

Die großen 500, No. 9,  
Neuwied, Luchterhand Verlag,  
1977.



Balance in  
billion DM



0 50 100

Stand der Grenzen: 1.1.1975

H. Krist, R. Wettmann  
Wissenschaftszentrum Berlin

The findings of JANSEN (1972) on the spatial behaviour of the largest industrial companies in the Netherlands relativise the possible negative effects one could expect from such a centralisation of headquarters. (NL. p.19). First he points out the very important role the large corporations have played in the creation of employment in the assisted areas. For instance, between 1950 and 1971 one-third of all new industrial jobs in the North were created by the four Dutch multinationals: Philips, Unilever, Royal Dutch/Shell and Akzo.

However, job decentralisation has been a selective affair. It resulted in a relatively large decentralisation of unskilled and/or production personnel, and a relatively limited decentralisation of highly skilled and/or non-production personnel, even though absolutely speaking the number of skilled jobs decentralised was considerable! The end result of the spatial behaviour of those concerns was a maintenance and further development of higher qualified activities in the West.

An interesting aspect with respect to the decentralisation of innovation potential was Jansen's finding that the decentralisation index for Philips' R & D personnel was considerably lower than that for the total corporate population, and even lower than that for highly-skilled personnel as a whole.

JANSEN'S (1972) conclusion is that regional policy should pursue the formation of sizable urban concentrations in the assisted areas if one wants to create real alternatives for the location of non-production, communication-intensive economic activities, outside the existing (mainly western) urban milieus.

In his 1979 paper, JANSEN again stresses the qualitative western dominance in the geography of companies' employment. The general decrease of industrial employment in the 1970's, however, has been accompanied by a relative stabilization of its geographical distribution pattern. There has been a slight increase in employment in the East, while in the remaining regions the percentage employment decrease was fairly even. Decentralisation has come to a standstill, but re-centralisation has not yet occurred. As an explanation of this phenomenon Jansen points at a greater tendency towards decentralisation of highly skilled and non-production labour in the 1970's for the investigated

corporations. He observes a growing relative independence of company units. An increasing differentiation of production in large companies makes it attractive to structure activities in such a way, that in certain aspects one can no longer speak of one company, but of a conglomerate of several companies. This means that a number of non-production functions, directed towards a specific activity, are being linked to division offices. JANSEN, 1979, p. 12).

Jansen's conclusions are striking: 'It seems to be hardly justified to connect the developments in the seventies with concepts derived from the centre-periphery kind of thinking', and 'If one would wish to distinguish a 'general tendency' in the developments, following from the behaviour of large companies, one could indeed point to the growing importance of divisional offices which "supports" the already rather widespread location of the headquarters of large companies in the Netherlands. This thus means that, considered from a company perspective, except for the North, the Netherlands as a whole may be considered to be one "urban field"' JANSEN, 1979, p. 13).

Jansen thus implicitly doubts the usefulness of a policy which would aim at establishing counterrailing growth poles in the peripheral regions through an innovation-oriented regional policy. In the Dutch context those peripheral regions still would be (the outer) part of the Randstad metropolitan complex.

### 3.3 Localisation of Business Services and External Contact Network of Firms

The diffusion of information is the key variable in the spread of new techniques. The wider and the more effectively information channels are covered by a firm, the greater the probability that a suitable new technique will be discovered and put to use (THWAITES 1978).

PAVITT (1971) postulates that one of the most effective methods of diffusing information is through personal contact, which requires employees of firms to belong to the appropriate knowledge network. Not only the process of communication but also the quality of information is important for the success of the innovation/diffusion process. All these advantages in general can be gained from the concentration in major urban regions (THORNGREN, 1970). Contact with the head offices of other enterprises, with government, financial institutions and the capital market are all vital to effective decision making and their concentration in one location therefore maximizes the efficiency of this process of minimizing the cost of managerial time in travelling to face-to-face meetings. (GB. CH. 2 - 2.3).

The higher density of information in major urban regions therefore is a good reason for looking at the urban hierarchy, although at the present time improved communication and transport systems may reduce the relevance of urban centres as focal point for the technological advance (PRED 1966). Finally, another reason for looking at agglomerations is the availability of joint services - including computer services, consultants, lawyers and advertiser - and the supply of highly trained technical and managerial personnel.

The concentration of business services in the core regions according to the urban structure is probably a common feature in all the countries of the European Community and Table 4 provides specific evidence for Italy, Denmark and France. Furthermore, in Denmark the close relation existing between the urban hierarchy and service employment has been tested empirically. Though this is proven for the supply side, the demand side however has been investigated only in Great Britain, i.e. the different behaviour of firms located in peripheral regions with respect to their external network. Thus, we do not yet know whether in the other EC countries, firms located in peripheral regions rely as far as the supply of information and business services is concerned mainly on their poor environment or on travel to the big agglomerations in order to establish better contacts. It is quite likely that only a few of them, as in the case of Great Britain, could afford the costs of such journeys. It is therefore important to test whether there is a different behaviour according to a typology of firms (e.g. size, ownership status, etc.).

Table 4: Regional Distribution of Business Services in some of the EC Countries

Country	Business Services	Year	Spatial Division	Location Quotient
I	employment	1971	North	1.2
	(specific tertiary sector functions)		South	0.6
DK	employment	1970	Copenhagen Metr. Region	1.7
	(superior services)		Rest	0.6
F	employment	1975	Paris Region	1.3
	(superior 'tertiary' activities)		Rest	0.9

### 3.3.1 Great Britain

A survey of interregional indigenous travel between the North East and the South East regions of England has indicated that travellers from the less communication-intensive sectors of North East industry are more likely to come from single-site independent companies, while in more communication-intensive sectors travellers are more likely to work in multi-site organisations (JAMES, MARSHALL & WATERS 1979). Moreover travellers from the less communication-intensive sectors are more likely to be in senior positions and to be visiting London for contact with sector firms; in externally controlled and more communication-intensive sectors travel extends further down the managerial hierarchy and is more likely to involve technical staff in contact with company head offices. In other words, in the independent firm the external inputs of information via personal contacts in the South East are much fewer than in externally controlled sector. Given the big difference in the quality of information environment existing between the South East and all the other regions, it is self evident that this aspect acts as severe constraint upon the growth of indigenous enterprises in peripheral areas (G.B. Ch. 3 - 5.5). The effect of external control of corporations upon the demand for and the supply of services in the peripheral area is discussed in point 2.5.

### 3.3.2 Italy

There are no specific studies in Italy analysing the contact network of firms as far as business services and information are concerned.

There is evidence however that the supply of "urban functions", i.e. all the services provided by tertiary sector that directly or indirectly are oriented toward satisfying the demands of industrial sector, as opposed to those oriented towards the demands of households, is unevenly distributed among regions. During the period 1951-71, the South was in permanent deficit with respect to the North as far as urban functions were concerned. Employment in urban functions was four times higher in northern regions than that in the Mezzogiorno in 1951, and this difference remained almost the same after ten years. (BUSCA 1973).



The situation improves if we look at the proximity to urban function supply, i.e. when considering employment in these services within the distance of 1 Km. (CAFIERO 1976). Between 1951 and 1971 the spatial diffusion of these activities followed in part the development of the urban structure, especially that of the second order metropolitan areas on the Adriatic coast, which had the highest growth rate in the same period. (I.p. 35-42).

### 3.3.3 Denmark

No information is available in Denmark as far as the type of contacts between firms and the local/remote environment is concerned.

Figures on the distribution of tertiary sector employment over space, however, provide a picture of the regional supply of these services. In 1970, all subsectors except the retail trade, show an increase in relative employment with increasing degree of urbanisation and this is most accentuated for superior services like business services. During the period 1950-1970, employment in business services in the Copenhagen Metropolitan Region, although remaining relatively stable, accounted for 60% of national employment in the same subsector by contrast with a population share of 35% (DK. p.11).

### 3.3.4 Ireland

In a study of technology transfer in Irish manufacturing industry, ALLEN (1977) obtained data on 73 innovations and analysed the information sources which first brought the new idea to the attention of the firm.

Although there was the spatial dimension to the study, ALLEN showed the same 20% of initial messages came from within the firm and this figure rises to 29 in the case of foreign firms. Of information sources external to the firm, almost all were obtained in direct personal contact and other firms constituted the major information sources: 73% of all messages came from them. The contribution of government sponsored research institutes was extremely poor. They accounted for less than 2% of the messages. (IR. p.10).

3.3.5 France

As far as the regional aspects of tertiary activities are concerned, there are in France 3 types of regions: (A. LIPIETZ - 1978)

A - Regions with a high technological level, strong relationship with decision and research centres, and highly qualified manpower in strong proportion -

B - Regions with an average proportion of average qualified manpower (traditionally industrialized regions).

C - Regions with a large reserve of unskilled (or very low qualified) manpower - partly resulting from declining obsolete industries -

One might even consider a fourth type of region - sharply declining agricultural regions, where a high level of rural emigration has made modern industrialization almost impossible, such regions may have a specialized tertiary "vocation", such as tourism.

The control region is of course the first one, and could roughly be limited to the Parisian Region. LIPIETZ thinks that the polarisation effects ( - Paris) resulting from tertiary developments will become as strong as they were for industrial activities. The B - regions (especially the North) are engaged in a contraction process which results in rather weak tertiary developments. Some regions escape this classification to some degree and have the scope to play a kind of supra regional role, acting as relay points in the spread of innovations, enjoying technological competence and, to a less extent, some sort of financial autonomy: these are Alsace, the southern part of France (Provence - Cote d'Azur and Midi-Pyrenees) and, more clearly, Rhone-Alpes (with Lyon as a rather important "metropole d'equilibre" - although the Lyon urban area is progressively losing its autonomy - and with Grenoble as a rather strong innovation pole). In the C - regions, initial industrialisation involves, as well as an urbanisation movement, a certain process of "modern tertiarisation", but mostly with unskilled labour.

More generally, the same tendency is evinced by the service activities as by the internal tertiary sector. Despite a kind of spatial decentralisation of these activities, this movement concerns almost exclusively activities which require low levels of qualification and initiative, and thus is unable to counterbalance the existing urban hierarchy.

3.4            Size of Firms: the issue of Small and Medium Sized Enterprises (SME)

Not only the specialized literature on innovation and diffusion of technology but also the actions of Governments in relation to these matters reveal a widespread belief that there is an important connection between a region's industrial structure in terms of the size of the firms which make up the regional economy and that region's power to adapt to changing economic fortunes by generating product or process innovations or by quickly adopting innovations which have received their first application elsewhere. But the nature of this connection between structure in firm-size terms and ability to adapt is something which is not properly understood. There is no unanimous view about the role of firm-size in relation to the adaptation process.

The study of this issue is impeded by the difficulty of assembling relevant data. There is no common view about what constitutes a small firm, or a medium-sized one, or a large one, nor should we expect there to be. Whether such a distinction is relevant, whether there should be a firmer classification or none at all with respect to size, and where the dividing lines should come between adjacent size classes, are matters which are likely to vary between, for instance, individual industries and individual countries.

For the purpose of studying the functioning of regional economies, though perhaps less so for national economies, size of firms is usually measured by reference to the number of persons employed. Quite often the employment data available relates to individual establishments or plants rather than to firms. But whether in precise terms discussion is about plants or firms there is no outstanding reason for most purposes why size should be measured in terms of employment. A case of roughly equal strength could be made out for measuring size in terms of capital employed or output

capacity. The main reason why employment (of labour) is most often used to represent size at plant level is the availability of that information and the absence of information about other characteristics. By contrast, turnover, or value added, or capital employed is more readily available for many multi-plant enterprises and tends to be used for national-level discussions of structure.

Employment data are hopefully available for plants or firms by regions arranged by size classes. Unfortunately the thresholds between adjacent size classes are not the same in each country and frequently data are not gathered for the smallest firms of all. These shortcomings impede international comparisons.

However, knowledge of size in such an absolute sense, with the same class boundaries applying across all industries irrespective of, for example, the capital intensity of the industry concerned, is of limited use for studying the response of firms in the sphere of innovation. The innovation-diffusion debate concerns itself with size because of the belief that variations in size between firms lead to differences in internal structure, in the extent to which firms undertake certain non-production functions themselves, and in the methods by which firms avail themselves of other services (if they do), notably in the methods by which they acquire technical knowledge and market information.

There is unlikely to be any regular variation in the degree of internal provision of services with changing employment size, such that fairly robust rules could be stated that firms employing more than a specified number of workers will have their own sales organisation or a research and development organisation while firms below those critical levels will not. Consequently it should ideally be possible to ascertain from each firm at the time of an employment or production census what functions it performs at which locations and what resources it applies to those functions.

Whether it would be possible to specify questions with enough precision to ascertain that kind of information in a more or less routine fashion is a matter which need not be considered here. The fact is that information about tertiary-like non-production functions performed by firms is not very plentiful and most of that which exists is the product of special research investigations of samples of firms.

At the present time there is a general belief that the larger the firms the higher is the probability that the firm will have an R & D capability or will at least employ professionally or scientifically qualified persons to ascertain market opportunities and to keep abreast of advancing production techniques. Smaller firms will tend not to provide such technical services for themselves or will treat such functions as a side-line undertaken by general management. The alternative is that the firm employs outside specialists for these purposes - or fails totally to keep in touch with economic, social and technical developments and ultimately goes out of business. As discussed elsewhere in this report, the relative inaccessibility of a location in information terms may cause firms in such locations to adapt inadequately to new technical and commercial situations. Lack of adaptability for such a reason may be more likely to arise in the case of smaller firms which do not employ their own specialists but which, because we are supposing them to be in inaccessible locations, are not able to avail themselves of assistance from external specialists, who are presumed not to exist locally. The foregoing is perhaps still largely a hypothesis, but there are research findings to support such a view, particularly in relation to the situation which exists in the areas of Germany most distant from the principal vibrant commercial cities.

Thus a preponderance of small firms might constitute a weakness in an area's economic structure, because it represents a brake on the area's ability to adapt. However, attention must be paid to an apparently contradictory view. There is a fairly widespread feeling that larger firms, particularly the largest, may no longer be regarded as a source of new jobs - and the provision of jobs is a principal objective of regional policy. There are some signs that in the current recession - or secular contraction, whichever it is - larger firms have reduced their employment most, while - as a recent German study shows - smaller firms have tended to hoard qualified labour as long as possible during recession and thereby had a positive effect on the labour market. If this is so it may mean that large firms have rationalised more than smaller firms have and may be in a better position to protect the remaining establishment in the longer term. Be that as it may, there is the prospect that larger firms will maintain their viability and commercial power mainly by appropriate investment and a gradual increase in their capital/labour ratio rather than by expanding employment.

In those circumstances there is a great interest in identifying and supporting small firms which hold out the prospect of breaking through into the big league. Not only existing small firms but as yet unfounded firms are seen as potential growth points and policies are practised by governments to facilitate the birth of new manufacturing firms. There is evidence to suggest that the rate of new firm formation is highest where small firms already play a relatively important part in the structure of an area. New firms are mostly founded by persons with an entrepreneurial spirit nurtured in an atmosphere of small firms - a potential founder has seen it done before. Areas dependent on a large plant do not provide the right ambiance - so the argument goes. This may to some extent explain the difficulties of some of the major urbanized areas in the EC to modernize and diversify their traditional industrial structure by attracting small and medium sized innovation firms.

Thus a population of firms with a higher-than-average proportion of smaller members is sometimes seen as constituting a potential advantage for the area concerned. There are more cells with a potential for growth and an appropriate entrepreneurial ambiance. Thus this interpretation is apparently in contradiction to the view discussed above, that small firms constitute a drag on an area's economy. Perhaps the reconciliation between the views hinges on the degree of accessibility of the location in the context of the circulation of information. Small firms may be a virtue where commercial and technical information is easily available, they may be a vice where such information is hard to come by. Put this way, an argument is immediately apparent why policies for promoting innovation and technology transfer might with advantage have a regional dimension to them.

The role of small firms seems to vary according to the industrial structure of different regions. Size of firms as a determinant of the innovation and the spatial diffusion process is therefore not a variable which can easily be held constant and for which general hypotheses can easily be defined.

Firstly it is suggested in some of the national reports that the degree of autonomy or dependency of small firms plays an important role. In that context the subcontractors are particularly mentioned. In legal terms

they enjoy a higher degree of autonomy than branch plants or small firms which have become part of a larger concern or holding company. But, as opposed to independent producers, their production depends to a large degree on technical norms provided by their dominant customer and similarly their market behaviour is strongly restricted by that relationship. In the innovation and diffusion process they play an ambiguous role. On the one hand they may profit from the technical progress within the firm to which they serve as a supplier. On the other hand, there is some evidence that subcontracting relationships are often organized in such a way as to guarantee to the large concerns a constant flow of technical innovations stemming from the small suppliers. This process of technology transfer has been observed by other studies in the context of takeovers and mergers. It often has a spatial aspect because of the large share of smaller firms in peripheral areas and of large companies in the core regions. It also corresponds to the observation that many technical innovations originating from firms in peripheral areas find their first commercial applications in firms located in central areas.

The issue of subcontractors seems to be so important because there exist a number of problem regions in the EC where the small subcontractor plays a dominant role and where the degree of integration of these firms into the innovation and diffusion process determines the economic fate of the region.

The Italian case shows that in addition to the subcontractors which prevail in the North, there are two other types of smaller firms which play an important role in the regional structure of the Italian economy. In the North a large number of small independent firms exist which are more artisan than industrial in character, do not produce for international markets and live on the domestic market in an oligopolistic situation because of the high quality and specialised characteristics of their products. While these firms and the subcontractors pose little problems in terms of the technological standards of their products, the situation in the South is very different.

There a large number of traditional producers for regional markets exist which increasingly are coming under pressure from technologically more advanced, more productive and better organized enterprises in the North exporting more and more to the South.

The Italian example shows, that the quality and roles of small firms differ widely from region to region in terms of their integration into the development of technology and markets. National and regional economic reports hitherto provide almost no information with respect to these roles to the presence or absence of those functions and activities which determine the innovation and adjustment potential of the small firms. This knowledge, however, will have to be increased before an innovation or diffusion oriented regional policy can be formulated and implemented adequately.



3.4.1 Bottleneck Factors Influencing the Innovation and Diffusion Potential of SME's

Despite the delineation problems concerning the threshold between small sized and medium sized firms mentioned above the sheer size of the SME-sector within the EC-countries makes it important to consider those firms' long-term viability in terms of their innovation/diffusion capability and the related bottlenecks. In the EC-context SME's (size < 500 employees) account for the following percentage of manufacturing employment:

UK (32%, 1972), W-Germany (40%, 1967), France (40%, 1971), Belgium (57%, 1970), Netherlands (60%, 1974), Italy (67%, 1971). (see NL. p.17)

According to the discussion at the MIP-Conference in Berlin it seems to be agreed that there are specific identifiable bottlenecks hampering the development of SMEs and their ability to adapt to changing economic structures. These bottlenecks give reason for concern and call for policy consideration in all member countries. The direct empirical evidence however is based entirely on German and British studies in this field since there is no other available. Consequently, any generalisation of these findings has to be made with great care and reservations have to be expressed about their applicability in detail to the several national situations. The British and German evidence nevertheless still seems to be important enough for clarifying our topic, given that it is to be used in the following remarks only for the erection of a conceptual framework for identifying structural deficiencies of SME's in comparable regions of other EEC-countries.

Although the importance of SME's for the diffusion and adoption process remains controversial<sup>1)</sup> it nevertheless seems obvious that an increase in the capability of SME's in peripheral or declining regions to adopt new technologies (diffusion) and to react flexibly towards changing market demands (innovation) is a prerequisite for a long term improvement of ailing industrial structures.

---

1) FREEMAN (1971, 1974) concluded that small firms contributed more to innovation than their share of research and development expenditure would have predicted. However, he concluded also that small firms contributed less to industrial innovation than their share of total employment or total net output would have predicted, although some of these innovations would be important.

The available studies on the conclusions of which we rely in this summary, agree on four major deficiencies (bottlenecks) which most SMEs have in common, though the effects of these deficiencies might be more acute and damaging in peripheral locations and for medium-sized rather than for small firms.

The two German studies by ELLWEIN et al. (1980) and EWERS, WETTMANN et al. (1980) have been concerned with problem regions which can be characterized as semi-industrialized and having an industrial structure mostly composed of SME's. This type of region can be considered as similar to many peripheral regions and other problem areas of the EC outside those regions dominated by coal and steel or agriculture.

A second important structural feature of the investigated samples relates to firm size (about 300 and 150 employees respectively<sup>1)</sup> and legal status. The German samples included only firms with an autonomous decision making structure, leaving out dependent enterprises or plants and thus consideration of their intracorporate environment.

Thirdly, we must point to the fact that among the small and medium-sized firms of the peripheral problem areas, the type of firm which could be called research-intensive "first innovator" or "first adopter" is not very frequent. Rather, "late adopters" of already mature technologies producing for mature and shrinking markets make up the majority of the firms.

Subject to all the above qualifications, we can argue from the evidence that autonomous "smaller" and medium-sized firms are characterised by a series of size-specific bottlenecks, which basically can be traced to deficiencies of the following factors:

- (1) Human capital (supply of highly skilled workers);
- (2) Marketing, technological and organisational information;
- (3) Creation of credit for high risk investments.

- These scale-specific internal structural weaknesses increase in the peripheral areas in comparison with firms of the same size and sectoral characteristics in the dynamic agglomerated regions.

---

1) This reminds us that the cited evidence is based on medium-sized firms rather than on small ones, such as the artisan-workshops one finds quite often in Italy for example.

- On the one hand, the environment which favours the ability to adjust (labour market, information availability, availability of credit means) and which is necessary to compensate for internal adaptation weaknesses with the help of external resources, is lacking in these regions.
- By the same token, an environment with poor innovation and adaptation conditions affects the inner structure of the firms and leads to an increase in size-specific problems of smaller and medium-sized firms in the problem areas.

In the following paragraphs, we shall be discussing the four main bottlenecks in more detail as far as evidence on a national basis is available.

#### 3.4.2 The role of SME's in their respective regional and national economic system

SME's must not be considered identical in respect to their function within the economic system of their countries. Within the context of a specific region/sector (for example core areas vs. declining or rural areas, microelectronics vs. textiles) SME's are quite diverse in respect to their innovative and adoptive abilities.

Discussing this point country by country we thus again have to be well aware of the above mentioned general differences between small and medium sized firms as well as the constraining bottleneck factors.

##### 3.4.2.1 Great Britain

The results of both the Bolton Committee (HMSO 1971) and of a more recent study by BANNOCK (1976) tend to depict a very undynamic small firms sector since the average age of small manufacturing firms is 22 years as compared with the US average of 7 years. (GB. Ch.5-1-3).

Particular problems seem to face small corporate firms with a development area location, since they rely almost totally upon the local environment for their sources of information and services (McDERMOTT 1976). If this

environment is poor then it is likely that performance will be adversely affected and competition with more efficient small firms located elsewhere in the country or with larger multi-site corporations may lead to decline within this indigenous small firm sector in peripheral locations. (on this topic see point 2.6.2) (GB. Ch. 3-5.4). The problem of information on market demands even within a poor environment is much smaller for subcontracting firms, since they rely heavily on one major trading partner (or one narrowly defined sector).

Generally speaking it follows from both German and British evidence that it is more important for the long term prospects of SME's in peripheral locations to develop efficient marketing intelligence, in order to learn as much about the needs of potential customers in order to keep up with their main competitors on national and international markets, than it is to increase the number of technically skilled staff as a manpower reserve. In most cases the impulse for innovations result from market information and not by accidental inventions.

Concerning the information bottleneck in terms of both availability (supply aspect) and the ability and willingness to search for information (demand aspect) it seems to originate from

- long distances to the main centres of research (peripheral locations with concomitant lack of agglomeration advantages) and
- communication problems: research institutions (universities, technical colleges) have no institutionalised channels through which to deal with the rather minor problems (which are calling for immediate elucidation by external expertise) of smaller firms. Therefore we can certainly state a need for regionalised organisations which would work as an inter-change agent to overcome communication barriers between SME's and research institutions.<sup>1)</sup>

There is evidence, however, that even small but relatively fast growing companies operating in peripheral locations have problems, partly due to the low level of business services (MARSHALL 1979a) and partly because of the difficulties associated with raising loans to finance expansion (PRAIS 1976). A particularly hampering bottleneck seems to exist concerning either assets or loans for the launching of new products on the market. This is proved by the fact that very often inventions and patents originating in the Northern parts of the UK are bought up by stronger companies

---

1) This comment on the information bottleneck applies with equal strength to the German situation.

(in capital terms) located in the SE region. The actual result is that many small, fast growing firms are forced to sell out to larger, more liquid companies, in order to raise the necessary capital. This may explain why a large proportion of takeovers are initiated by the acquired company (NEWBOULD 1970). (GB. Ch.4-2.8., 2.9).

Concerning the specific problems facing new firm foundation the available evidence is not fully in agreement:

- on the one hand there seem to exist barriers for new enterprises the further one moves from core to peripheral regions by increasing the distance to the "innovation-inclined" climate of the core area;
- on the other hand, the tendency to establish new firms is greater in more rural (non heavily industrialised) areas, especially in free-standing county towns. Indigenous employment growth is therefore inversely related to the urban hierarchy.

A hampering factor certainly lies in the industrial and plant size structure of peripheral regions. Since average plant size is greater there, in both indigenous and mobile industries, fewer new firms tend to be set up in peripheral areas. New firm foundation is inversely related to the degree of dominance of large firms in the respective areas.

Two studies on new firm foundation (in the rather central East Midlands region and the county of Cleveland, Northern region) proved that new firms tended to reinforce the existing industrial structures as founders generally set up within their own industrial sector rather than moving into totally new lines of business. The East Midlands evidence also suggests that high rates of entry are also associated with high rates of closure. Examination at the plant level suggests, that a major factor influencing closure could be termed "managerial incompetence". Many small firms fail to cope with everyday matters of marketing and finance and tend to ignore future planning in form of R & D. (See U.K. Ch. 5.3).

A last aspect to be mentioned when dealing with growth aspects and bottlenecks of new firms lies with the type of entrepreneur. As "ideal types" one can differentiate between the "craftsman" and "manager-opportunist". (For the following see U.K. Ch. 5.3.2 - 5.4.1).

The 'craftsman' founder is characterised by working class background,

skill in mechanical engineering and low level of formal and management education. He sets up the firm as a result of some catalytic event rather than through planning and relies heavily on personal contacts to supply local industry with its specified needs. The firm tends to remain small exhibiting only slow growth. Often this type of new firm won't grow beyond a certain threshold due to a lack of managerial experience. The 'opportunist' founder tends to have experience of family business, be better educated with management experience. He has had a long-standing ambition to set up his own business and does so if his career prospects are blocked. He will raise capital anywhere unlike his 'craftsman' counterpart who uses personal funds or loans from friends and family. He will set up a firm in unfamiliar industries and locations and will actively search for new markets and products. This activity often results in high growth rates and diversification where the firm does not produce work to 'specification' but goods with more general applicability (See also GUDGIN 1978, JOHNSON and CATHCART, 1979a and b).

The size and type of potential founders pool to be found in any region is important because they tend to produce local results i.e. founders tend to set up in their own locality. The quantity and quality of potential founders in a region may be influenced by their industrial and organisational experience which is known to vary between regions as a result of the concentration, centralisation and spatial pattern of functions and sectors within manufacturing industry. As a result peripheral areas may have fewer personnel with the characteristics of founders in general and of 'opportunist' founders who appear to be particularly valuable.

Contrary to popular belief most new firms are not set up to exploit some new technique but usually operate within well tried technologies and sell within existing market areas (GUDGIN 1978). But the importance of this sector is its ability to form the basis of modern industrial complexes and centres, and its ability to attract and to employ highly skilled and professional people in particular locations (DANILOV, 1969). Such firms often exhibit high rates of output and employment growth and are less prone to failure than more traditionally based new firms. These characteristics seem to fit closely the concept of the 'opportunist' type of new firm described above.

#### 3.4.2.2 Italy

Regional structure of firm size in Italy is well described by the 1971 Census of Industry. In the South small firms accounted for 64% of total employment, medium sized firms for 20% and large firms for 15%. Much more balanced was the situation in the North West, where small firms accounted for 34%, medium sized firms for 35% and large firms for 31%. The position of central Italy and North East was to some extent in between these two polar structures: the former closer to the North-West and the latter to the South (I.p.30). If we consider the poverty of the environment in the South in terms of the superior tertiary sector, head offices and general headquarter functions it is quite likely that these firms do operate at a very low level of performance.

The locational pattern of small firms shows marked differences according to their innovative abilities:

- In the North Eastern parts and most of Central Italy one finds small independent firms which are working in an innovative, quasi-oligopolistic environment since they are not affected by international competition due to the high quality of their products. Their mode of production is more artisan-like than industrial.
- The small firm sector in the whole of Northern and Central Italy, however, is dominated by firms which act as subcontractors for bigger companies. These firms too are not in a very competitive situation, especially where they are suppliers for state holdings.
- The overall majority of Italian small firms are located in the South. They are producing traditional goods for the local markets under nearly perfect competition. Their obvious lack of innovativeness leads to increasing imports and concomitant competition by Northern based firms, as the consumer demand in the South increases.

#### 3.4.2.3 Denmark

In Denmark the average firm size is small compared to many other European countries. The average number of employees per manufacturing company and location is given in the following Table 3.4.2.3

Table 3.4.2.3

	Average no. of Employees per Manufacturing Company <sup>+) </sup>
Rural areas	36
Medium-sized cities	51
Large cities	58
Copenhagen Metropolitan Region	61
Whole Denmark	56

<sup>+)</sup> with more than 5 employees

#### 3.4.2.4 Ireland

Small firms, branch plants and enterprises engaged in standardised mass production predominate in development areas. Between 1960 and 1973 the New Industry grant aided projects established in designated areas employed an average of 84 employees; those set up in non-designated areas had a mean payroll of 167 employees (O'FARRELL, 1975) (IR.p.10).

#### 3.4.2.5 France

On a highly theoretical level and concerning empirical evidence relying mostly on West German experience, the national report on France quotes a study by CLAUSTRE (1979) in which the role of SME's in an open, developing economy is stressed as an innovative one with long term prospects of success.

The study emphasises that in order to react appropriately to the changing structure of the national and international economy it is necessary for a SME to be structurally connected with a segment of an international (or at least European) market. The ability to seize market opportunities and to develop successfully depends on the general surroundings and especially on the existence of institutions to help them in distribution problems, in access to innovations and patents and in availability of the capital market. To be efficient, these situations must be decentralised and operate on a regional level. (See F pp. 29-31).



From a study on the banking system in Alsace (CLAUSTRE, 1975) it becomes obvious that a regionalised and differentiated banking system is one of the important promoting factors for the development of the regional economy. (For the following see France, pp. 19-21).

SME's have the chance to obtain risk capital and other banking services from decision makers within the region, which makes them less dependent on Paris-based decisions and thus more flexible. Many of these firms are controlled by or have strong market ties with either large French firms with an Alsatian basis or foreign firms; a large share of their market is in other European countries. This provides a specific market for the regional banking system, which in return is in a position to provide specific services much better than the national banking system could do. The study provides a wide range of examples of how the restructuring and modernisation of branches like textiles, mechanics, food industries, chemistry was facilitated by the specialized nature of the banking services. Also local branches of national and foreign firms were much better integrated in the local texture than in other regions.

According to the author, the basic reasons for these beneficial results lie in the attitude of the local bankers who are generally biased in favour of local development; they also have a much better knowledge of local conditions and local entrepreneurs, enabling them to engage safely in loans which from Paris would look too risky. This works mainly for the well being of local small and medium-sized firms, which they help efficiently in case of restructuring, enlargement, establishment of new ties and even to reinvest in the most suitable way when they show a desire to get out of their previous business

The general conclusion to be drawn from this study is that existence of an autonomous strong regional banking system is a necessary condition for the development of a strong, equilibrated and autonomous regional industrial system. The case of Alsace shows that the development of this region depends mainly on economic forces from outside of the region, at national and international level. The existence of a regional banking system does not create any form of economic independence, but it helps to organise the dependence on outside forces in a more equilibrated way, to prevent the destruction of local potential, and to get regional firms involved in the internationalization of the economy.

### 3.4.2.6 Germany

Two very recent studies of the innovation behaviour of small and medium-sized firms show ambiguous results with respect to functional deficits of this type of firm in peripheral regions.

The study by ELLWEIN et al. (1980) already cited has made comparison of a large sample of medium-sized firms (with around 300 employees) located in core regions and in peripheral areas. The study comes to the conclusion that in the area of (1) information, (2) personnel and (3) quality of production and with respect to firm characteristics such as quality of management, capital structure and access to markets, firms in both types of regions are very similar. Differences which do exist seem to be related to sectoral rather than to spatial conditions. However, typical innovation problems of medium-sized firms are being reinforced in peripheral areas.

The study by EWERS, WETTMANN et al. (1980) based on interviews with private and public technology and innovation consultants has indicated that small firms (< 150 employees) in peripheral regions suffer from deficiencies in the area of highly qualified labour<sup>1)</sup> and innovation-related information (technology and market information). Management styles as well as risk<sup>2)</sup> capital are considered to be of some importance, though evidence is sparse and partly controversial. The first two deficiencies seem to have a supply as well as a demand aspect. Regional supply of these factors is not only lower in peripheral regions than in core areas, but the propensity and the capacity to utilise existing supply is reduced. This result could in fact mean that the regional or anyhow locational environment has repercussions for the internal structure and the demand behaviour of firms, and that it generates over time specific innovation-hampering conditions. This effect will gain importance with decreasing firm size.

---

1) By definition, SME's have a rather limited internal labour market which restricts their ability to react swiftly to short-term changes, which would imply the functional rearrangement of their staff. On the external market there exist marked differences between core areas providing a diversified spectrum of highly skilled persons, "cheap labour" in the form of students and other persons looking for part time employment.

2) Although there are regional incentives (grants + loans) available for investment projects in assisted areas it seems to be that there is a marked capital shortage for certain innovation-related investments like the cost of product development and market introduction.

3.4.2.7 Netherlands

No specific information is available on the regional innovativeness of small and medium sized firms as well as their location pattern, apart from the fact that the Dutch assisted areas have a lower large firm/small firm ratio than the Randstad. For want of regional data, a measure of the importance of small and medium-sized enterprises in the Netherlands can only be given at the national level.

There are quite a number of innovation promoting instruments specifically devised to aid SME's which, however, have no specific regional dimension. (NL. p.28). Therefore, assisted areas might benefit from innovation stimuli directed at SME's. These regions, on the other hand, probably will not benefit more than proportionally from SME-directed incentives despite the above mentioned overrepresentation of SME's in the assisted areas. If SME's were spread evenly over the country, Randstad-SME's in all likelihood would still be the more innovative, and therefore would be making more use of incentive schemes.

3.5 Ownership of firms: The issue of large multiplant firms and external control

Firms or plants in peripheral areas may be externally controlled by being owned by multinational/multiregional corporations. Such control may be the result either of acquisition of an existing firm or of the setting up of a new plant.

External control per se however, does not seem to be critical: what is more important is the type of organisational structure associated with the inward investment, the nature of the technology employed, e.g. its stage in the product life cycle, the degree of integration between indigenous and non-indigenous companies and in case of takeovers, the final result of the acquisition (e.g. closure of the firm, contraction of activities, centralisation of functions).

In synthesis the principal argument raised against the presence of firms externally controlled in the assisted areas is that in general the corporation strategy tends to intensify already existing trends such as:

- centralization of R&D functions
- centralization of headquarter functions
- provision of low quality services in the local area.

In five countries, Great Britain, Italy, France, Germany and Ireland, peripheral regions are characterized by a very high percentage of firms externally controlled either by multiregional or multinational corporations (see Table 5).

The degree of external control varies from country to country but in general it is more than 50% of total employment/new firms located in the peripheral regions. The extent of external control is extremely high in the Northern Region of Great Britain, with 79% of manufacturing employment being externally controlled in 1973.<sup>1)</sup> It is of interest to note that in Ireland the number of new plants externally controlled (in this case from abroad) is even very high in the Non Assisted Areas; thus confirming the peculiar process of industrialisation of this country.

---

1) The New Industry Programme enterprises are responsible for approximately 52% of total manufacturing net output. The population of enterprises outside the N.I. sector will exhibit a much lower degree of external control but precise figures are unavailable.

Table 5: Regional distribution of firms according to ownership status in some E.C. countries

<u>Country</u>	<u>Employment/firms externally controlled</u>	<u>Year</u>	<u>Regions</u>	<u>%</u>
GB	employment	1973	Scotland	59
			North	79
I	employment	1977	South	55
F	employment	1973	Rest of France (Paris Region excluded)	44
D	all new firms established in peripheral regions	1978	Peripheral Regions	50
IR	new industry plants (set up under the IDA's New Industry programme in 1960-73)	1978	Assisted Designed Areas	62
			Non Assisted Designed Areas	46
DK	not important			
NL	not important			

---

In two countries the issue of external control seems irrelevant; in Denmark because of the average number of addresses per company is very small (see DK p.23) and in the Netherlands since the adoption lags between Randstad firms and firms outside the West Region are presumed to be rather short (see NL. p.22).

The impact of external control on internal organisation of firms has been tested. There is in fact evidence that disparities in the regional level of employment qualification in general, and of office employment in particular (especially R & D, marketing and other highly specialised tertiary or non-production functions), are explained by the external control of firms at least in Great Britain, Italy, Ireland and Germany.

Furthermore, in Germany external control seems to affect even the decision of firms concerning the choice of suppliers and markets. Native firms are considered as suppliers only when they succeeded in making contact with corporation headquarters. (D.p.92). Conversely in Ireland branch plants seem to enjoy a higher degree of purchasing autonomy (see IR p.12).

It is of interest to note that in G.B. the increasing external control in peripheral areas appears to be more a consequence of takeover activity than of branch plant immigration.

### 3.5.1 Great Britain

A very considerable proportion of manufacturing activity within peripheral regions is controlled from outside. In Scotland for example 59% of manufacturing employment in 1973 was externally controlled: 40% by English-based companies and 15% by American-based companies (FIRN, 1975). Evidence for the Northern region (SMITH, 1978) suggests that the extent of external control in this region is even higher, with 79% of manufacturing employment being externally controlled in 1973. Despite the higher level of existing external control in the Northern region the growth in the number of externally controlled establishments in the decade up to 1973 (+ 68%) indicates that the trend towards increasing externalization of control may be continuing. (GB. Ch.3 - 2.6)

Turning to the behaviour of overseas firms in peripheral areas evidence suggests that foreign investment in the North broadly reproduces the national sectoral pattern of overrepresentation in the more technology intensive industries. These firms, because of their high level of external control, do not possess many of the higher order functions, (GODDARD et al., BUSWELL and VALLELEY 1978) especially R&D, do not provide a significant local demand for these services (MARSHALL, 1979b) and appear to be poorly integrated in terms of backward and forward local material linkages. Even those firm headquarters within the region do not exhibit great functional complexity. Moreover, available

evidence suggests that foreign firms, although they have introduced new and diversified technologies to the regional economy, have not operated as a very effective change agent especially in the diffusion of technology, thus not contributing greatly to the mobilization of the indigenous potential (GB. Ch.2 - 3.6 and 4.4).

Externally controlled firms seem to be the main factor "explaining" the disparities between national and regional level of office employment (CRUM and GUDGIN 1977). Multi-region companies show a general tendency to centralise certain functions (e.g. general management, data processing, public relations, purchasing etc.) within the national head offices. Conversely, routine functions are more evenly dispersed between establishments including branch plants. (GB. Ch.3 - 3.2).

External control of firms located in assisted areas also affects the demand for and the supply of local services. Ownership appears to be the single most important factor in predicting an establishment's pattern of service purchases, and this has serious implications for the growth of services in peripheral regions. As more and more head offices centralize in one location, the demand for a wide variety of services increases at that location. This leads to an increase in the supply of such services that in turn increases the centre's attraction as a location for head offices. The development areas on the other hand, by becoming more dependent on the branches of multi-site firms, suffer a decline in the quality of services available in the local area (GB. Ch.3 5.2 and 5.3).

It should be noted finally that increasing external control of peripheral areas in Great Britain appears to be more a consequence of takeover activity than of branch plant immigration or a slow rate of indigenous new firm promotion (SMITH, 1978). This has specific implications for the indigenous growth potential, especially when acquired firms are fast-growing small and medium sized enterprises. Evidence suggests that takeovers often lead to a diminution in the growth rate of subsidiaries or even in closure of the acquired firms' plants (GB. Ch.4 - 2.2 and 5.3 to 5.6). Even when closure or contraction does not occur, there is a strong likelihood that the range of activities carried out in the subsidiary will be substantially reduced (GB. Ch.4 - 4.1 to 4.7).

### 3.5.2 Italy

One of the most interesting results of a study analysing the industrial structure of the Mezzogiorno is that the majority of establishments in terms of employment is externally controlled. (CESAN, 1978). Some 56% of people working in manufacturing firms in southern regions are employed by multi-national/multi-regional firms (20.9% by private firms; 25.1% by State holding firms and 10.1% by multi-national corporations) (I.pp. 23-25).

Thus the low level of R&D activity performed at regional level (see above part 2.1.2) may be explained in terms of external control of local establishments. Evidence suggests (BUSINESS INTERNATIONAL 1974) that multinational corporations operating in the South tend to centralize headquarter functions. This study shows in fact that decisions concerning research and development activity are in the majority of cases taken by parents or regional headquarters (i.e. headquarters responsible for Europe in the case of U.S. or Canadian corporations). Moreover, other strategic decisions, like those concerning new investments or capital commitments above certain limits are taken by parents, confirming the low degree of autonomy of branch plants located in the Mezzogiorno. (I. p.30).

The high level of external control shown by southern firms, together with the peculiar firm size structure, is probably the main element explaining the spatial distribution of non-production employment (see above point 2.2.2). The typical characteristic of a branch plant economy of the Mezzogiorno is confirmed by the underrepresentation of managers and clerical workers, and the overrepresentation of manual workers (with the lowest and the highest location quotients respectively) whereas the predominant role of small independent firms is confirmed by the overrepresentation of entrepreneurs and independent workers. The opposite picture is shown by North-West region which centralises directional functions (i.e. managerial and clerical) but, owing to the predominant role of large firms, has fewer independent workers and entrepreneurs than the respective expected values. (I.p.33).



### 3.5.3 Denmark

In Denmark the average firm size is small compared to many other European countries. Furthermore, the average number of addressees per company is small (namely some 1.9 for the manufacturing industry); thus the multi-plant aspect is not of very great importance in a Danish context. (DK. p.23).

However, it should be mentioned that there is a strong overrepresentation of headquarters of multi plant corporations in the agglomerations. In 1975 some 56% of headquarters of the 200 largest industrial companies were located in the Copenhagen Metropolitan Region (DK p.23).

Moreover, if we look at the regional distribution of manufacturing establishments broken down according to the main type of activity carried out (i.e. production, administration and sales) we find that Copenhagen Metropolitan Regions centralize both administration and sales with respect to rural areas (DK. p.24).

### 3.5.4 Ireland

Of the 208 New Industry plants, i.e. set up under the IDA's New Industry programme 1960-73 in the most heavily assisted designated areas, 61.5% were branch plants controlled from outside the region. Conversely in eastern N.D.A. 45.7% of the New Industry projects established were controlled from abroad (O'FARRELL, 1978).

Consequently in both areas, but particularly the peripheral one, the manufacturing sector displays a high degree of external control. (IR. pp. 10-11).

In a survey of 207 multi plant firms, 62 of which were Irish owned, OHUIGINN (1972) showed that the proportion of plants with characteristic headquarters functions was low: almost two thirds of the plants did not perform the marketing function and 78% were dependent upon their parent organization for research and development services (IR. p.11).

Branch plants of both MNE's and NMRE's seem to enjoy a high degree of purchasing autonomy (O'FARRELL and O'LOUGHLIN (1979). It is apparent that there is a degree of technological transfer from branch plants of MNE's to

indigenous enterprises through the mechanism of backward linkages although there is no systematic evidence to assess its importance (IR. p.12).

Evidence suggests that intraregional locational factors (in particular the degree of proximity to the nearest large town) are the most important ones in terms of explaining the proportion of service payments allocated to the local economy within 20 miles of the plant. Hence a high proportion of service expenditure by firms located in those areas of peripheral regions which are remote from large urban centres leak out of the region to Dublin and other major centres, thereby further increasing the external dependence of plants in such environments. (IR. p.12).

#### 3.5.5 Germany

Over half of all firms which were established in assisted regions were branch firms of large corporations which had their headquarters outside the assisted region.

The most obvious consequence of this phenomenon is the effect on the quality of employment opportunities which are offered by such plants. Usually unskilled or low-skilled workers are employed, whose knowledge suffices to carry out the most standardised types of work. (see D.p.91).

The management of such a branch is generally limited to the routine administration. More important decisions are generally reserved for the headquarters. To these more important decisions belongs particularly the choice of suppliers and markets. Supply and subcontracting relationships of regional branch plants are normally decided upon by central headquarter units. Supply and sales are therefore rarely from and to the region in which the branch plant is located. The degree of economic integration of branch plants in their regions is therefore rather low.

While the establishment of a new branch plant may not increase the innovation potential of a region, mergers and takeovers of small independent firms in peripheral regions by large corporations located in the metropolitan centres may reduce the decision-making potential.

There does not exist any systematic evidence of the regional impacts of such mergers and takeovers. The post-merger transfer of central functions such as R&D, from the controlled firm to the headquarters of the buyer has often been reported.

### 3.5.6 France

The very strong concentration of headquarters in the Parisian Region involves a high degree of dependence on the other regions vis-à-vis Ile de France. This strong imbalance between Ile de France and the provinces is enforced by the low dependence of the regions vis-à-vis each other.

Valeyre's study presents an indicator of dependence as far as employment is concerned. It measures the share of employment depending from extra-regional headquarters on the total regional employment. This ratio is, as expected, very low for the Parisien Region (2.9%) and rather high for the provinces (43.6% - national average). From those 43.6%, 39.9% show the dependence vis-à-vis Ile de France and only 3.7% vis-à-vis other regions - there are also very important variations by regions: while the dependence-ratio is very moderate in Alsace and the Southern part of France, the dependence is strong for the North, the East, and the West, and even very strong (66%) in the Bassin Parisien, i.e. the wider area surrounding the Ile de France.

### 3.5.7. Netherlands

Since adoption lags between Randstad-firms and firms outside the West-Region is assumed to be rather short, the question of external control does not seem to be of much importance. (N.p.22).

### 3.6 Productivity

It has also been suggested that indigenous companies in peripheral regions have lower levels of output per operative than the externally controlled plants in the same area or the "average plant" for their respective industries. These results may be partly attributable to a failure to adopt the latest process innovations. (GB. Ch.5, 1.1).

### 3.6.1 Great Britain

Evidence concerning the poor performance of the indigenous sector in one development area, the Northern Region, has been produced by MARSHAL (1979b). Levels of productivity below the national industry average were discovered for most of his sampled establishments. Moreover, independent plants were found to have lower levels of productivity than branch plants located in the same regions. This was related to the quality of the local information environment and to the opportunity that branch plants have to take advantage of the information network of their corporation. (GB. Ch.3 - 6.1).

Another significant factor was identified by CRUM and GUDGIN (1977), who found that the proportion of non-production to total employment in single region organizations is related to productivity.

In general therefore the level of productivity in an establishment is likely to be affected by information and services available to that establishment, and has also been found to be linked to the levels of non-production employment. (GB. Ch.3 - 6.3).

### 3.6.2 Italy

To some extent similar conclusions are those reached by a study analysing the trend of investment, value added and employment by regions in the period 1963-73. (AMENDOLA-BARATTA 1978).

Total manufacturing investment in the South grew during these years at a rate four times higher than that in the North; value added and productivity tended to grow with almost the same speed. Even more striking figures are those referring to individual industries. In some cases (food, textile, clothing) northern industries showed an increase in value added and productivity equal or even higher than in the South despite a reduction of capital investments (I.p.14).

After having analysed all the various factors that might explain these different performances, the authors argued that differentials in regional level of productivity are likely to be affected by such elements as human capital, R & D activity, internal organization of the firms and so on.

### 3.7 Human Capital as a Determinant of the Regional Disparities

Although at the moment we have very few available data on this topic, there is some evidence that the human capital and particularly the structure of qualification constitute a quite important determinant of regional development.

As an example, we will take the case of the French structure of qualifications and see what kind of consequences it may have on the regional development. We will base our investigation mainly on two French studies which were published in 1978. The first is the study written by Antoine VALEYRE (1978): "La polarisation de l'emploi dans l'espace français", which gives a general idea about the qualitative polarization of employment in France. The second, "La dimension régionale du développement du tertiaire", written by Alain LIPIETZ, studies more precisely the qualitative polarization inside the tertiary sector.

#### 3.7.1 The Qualitative Polarization of Employment: The Case of France

A precise approach to the spatial distribution of employment as far as the level of qualification is concerned presents some difficulties. Thus, the available data must be considered with great care, and reservations have to be expressed from the beginning.

The difficulties in using the available data are a result of the very vague definition of the concept "qualification", which may have different meanings if we consider different investigations and sources. The information can be very confused in that it often does not make a clear distinction between qualification in terms of the level of training of the active population, and qualification in terms of job complexity. (A third category often interferes in this already confusing amount of information, i.e. the way jobs are classified according to the hierarchy and wage schedules, which result from political transactions and the institutional framework.) The first two are more important, to the extent that they do not represent only a "linguistic" difficulty. Furthermore, as we shall see in this paragraph, they are quite significant for the often wide discrepancy existing between the regional supply of medium or highly skilled manpower and the complexity of available jobs. We must, therefore, consider with

extreme care the following information which is based on statistical data gathered in the study of VALEYRE (1978), and which could be resumed in the following table (see Table 3.7.1.1).

As expected, the most qualified manpower is to be found in the Parisian Region. Generally speaking, there seems to be a relatively perfect coincidence between the level of training and the regional hierarchy, with depressed regions having the least qualified manpower. However, there are some exceptions, particularly as far as the Bassin Parisien and the southern part of France are concerned. The former shows a rather dynamic economic development and is supplied by a rather poorly skilled manpower. It could be explained by the kind of economic development of this region which presents a very high dependence rate on the Parisian Region. Conversely, the Southern part of France, which can be considered as a rather peripheral area, is supplied by a rather highly qualified manpower.

As far as spatial distribution of qualified jobs is concerned, the available data show a heavy concentration in the core regions, and particularly in the Parisian Region, compared to the rest of the country. This contrast (between Paris and the provinces) is not the only one. There is another functional contrast between the North and the South. Thus, as far as jobs complexity is concerned, we could draw the following typology, keeping in mind that the data on this jobs complexity have to be considered against the respective rate of independent workers and wage earners in the different regions:

First category: the Parisian Region, with a very high job complexity (and a very high number of wage earners)

Second category: Rhône-Alpes and Provence, Côte d'Azur, with a high proportion of qualified jobs (and a high number of wage earners)

Third category: North and East with an average job qualification (and a high - or very high - proportion of wage earners)

Fourth category: South-East, Auvergne, Languedoc, with an average job qualification and a high proportion of independent workers

Table 3.7.1.1.1 Manpower Qualification and Job Complexity by Regions (synthetic index)

R e g i o n	Job Complexity			Manpower Qualification			Difference betw. Job Complexity and Manpower Qualification	
	Male Manpower A	Female Manpower B		Male Manpower C	Female Manpower D		Male Manpower = C-A	Female Manpower = D-B
Parisian Region	103,8	104,8		106,1	105,7		2,3	0,9
Champagne-Ardenne	98,0	99,7		96,7	98,4		-1,3	-1,4
Haute-Normandie	98,5	99,9		96,6	97,7		-1,9	-2,3
Basse-Normandie	97,1	97,7		95,3	96,2		-1,9	-1,4
Bourgogne	97,8	100,0		96,4	99,6		-1,4	-0,3
Nord	98,4	100,7		98,1	99,5		-0,4	-1,2
Lorraine	98,6	101,4		97,3	100,1		-1,3	-1,3
Alsace	99,9	100,5		98,7	98,1		-1,1	-2,4
Franche-Comté	98,5	100,3		98,3	100,1		-0,2	-0,1
Pays de Loire	97,4	98,3		94,9	96,0		-2,5	-2,2
Bretagne	97,2	97,5		97,4	98,3		0,2	0,8
Poitau-Charentes	96,8	99,2		94,6	98,0		-2,2	-1,2
Aquitaine	97,9	99,6		97,7	100,2		-0,1	0,6
Midi-Pyrénées	97,9	100,9		98,4	102,7		0,5	1,8
Limousin	96,7	97,8		95,6	97,7		-1,0	-0,1
Rhône-Alpes	99,1	101,5		100,2	102,6		1,0	1,1
Auvergne	97,2	99,9		97,8	101,8		0,5	1,9
Languedoc-Roussillon	98,1	103,2		99,1	105,9		1,1	2,6
Provence-Côte d'Azur	100,0	103,3		101,8	106,2		1,9	2,9
Corse	97,6	105,9		101,1	111,2		3,5	5,3
T o t a l France	99,3	101,3		99,3	101,3		-	-

Source: Collections de l'INSEE, R 26, Aug. 1977.

Fifth category: Bassin Parisien (with the exception of the Basse-Normandie), with a low job qualification

Sixth category: West, Basse-Normandie, Limousin, with a very low job qualification and a high proportion of independent workers.

It is rather difficult to determine precisely whether these polarization trends are increasing and to what extent. However, a recent study of the French National Statistic Institute (INSEE) shows that the qualification level of the newly created jobs is generally lower than that of the existing jobs. Thus, a higher rate of decrease in qualification can be seen in new industrialized regions.

Another important point is the relative discrepancy between job complexity and manpower qualification in some regions. Generally speaking, a very high interdependence is to be seen between the production system and the educational system of a region, between the spatial hierarchy based on the job qualification and the spatial hierarchy based on the qualification of the population. However, there are some exceptions, particularly in the Southern regions of the country. Compared to the complexity of the available jobs, the population is overqualified. Two categories of reasons can be pointed out: the first one relates to rather complicated historical factors and the second one could be described as a kind of "social regulation": i.e., the population tends to remain in the school and university system a rather long time to avoid the unemployment and emigration which are very severe in their peripheric regions.

### 3.7.2 The Qualification Issue in the Tertiary Sector

The general data on qualification we have mentioned in the second paragraph could be completed usefully by data which more precisely concern the tertiary sector. According to LIPIETZ (1978): "La dimension régionale du développement du tertiaire", the polarization of the French economic system due to the development of tertiary activities is (and will be) still higher than the polarization resulting from the industrial development during the past decades, to the extent that if there is a certain



tertiarization of the peripheral regions, it does not mean that these regions are reaching a "post industrial" level. There still are heavy imbalances between the core regions and the peripheral areas which are even increasing because of the spatial distribution of the tertiary activities.

The following table shows the distribution of superior, general and unskilled activities within the tertiary activities, and presents a comparison between the Parisian Region and the provinces on the basis of a few exemplary regions (see Table 3.7.2.1).

LIPIETZ (1978) calculated an index of relative overqualification as follows:

- o = represents whole France
- i = represents a region
- A = is the proportion of "superior" qualification
- B = is the proportion of "inferior" qualification.

Then, the index of relative overqualification for a given region will be:

$$I_i = \left[ \frac{A_i/A_o}{B_i/B_o} - 1 \right] \times 100$$

For the regions which are considered in Table 3.7.2.1, one finds the following results (Table 3.7.2.2):

Table 3.7.2.2      Index of Relative Over-Qualification

Provinces	- 9
Paris Region	+24
Rhône/Alpes	- 7
Nord/Pas de Calais	-19
Alsace	- 2
Centre	-18
Bretagne	+ 1
Midi/Pyrénées	- 6
Languedoc/Roussillon	0
Provence/Côte d'Azur	+ 4

Thus, there is obviously an overwhelming preponderance of the Paris Region.

Table 3.7.2.1

Qualification Level in the Tertiary Activities

(in percentage of the total active population)

	France	Provinces	Paris Region	Rhône Alpes	Nord Pas de Calais	Alsace	Centre	Bretagne	Midi Pyrénées	Languedoc Roussillon	Provence Côte d'Azur
<u>A. Superior Activities</u>	6,7	5,4	11,3	6,2	5,0	6,7	4,8	4,8	5,8	6,2	7,2
- female manpower	23,2	22,9	23,7	23,8	20,8	22,0	22,8	22,6	26,7	23,0	22,4
<u>B. General Activities</u>	12,7	11,5	16,9	12,9	11,7	12,1	11,1	10,7	11,7	12,0	13,1
- female manpower	45,2	44,6	46,6	45,6	40,7	39,2	45,5	45,9	47,0	48,0	44,6
<u>C. Unskilled Activities</u>	17,7	15,8	24,0	17,5	16,3	18,0	15,4	12,9	16,3	16,1	18,3
- female manpower	63,9	62,1	68,1	63,0	58,8	62,7	65,7	64,4	58,5	56,4	62,4

Source: B.E.R.U. Study "L'emploi tertiaire et les régions." 1975

As far as the other regions are concerned we must distinguish between three types of regions:

- a) regions with an old industrial tradition  
(Rhône/Alpes, Nord/Pas de Calais, Alsace)
- b) regions with an old agricultural tradition (Centre, Bretagne, and to a lesser extent, Midi/Pyrénées)
- c) Mediterranean regions (Languedoc/Roussillon and Provence/Côte d'Azur).

The first regions, despite some common characteristics, present differences which are pointed out in a study from the B.E.R.U. (BUREAU D'ETUDES RÉGIONALES ET URBAINES, "L'EMPLOI TERTIAIRE ET LES RÉGIONS" 1975) analysing more precisely the tertiary activities. Some of their results are summarized in the following table:

Table 3.7.2.3 Density of Some Tertiary Activities in the Old Industrialized Regions

(If 100 represents the average density of these activities for the French provinces:)

	Alsace	Nord	Rhône/Alpes
Consultant Agencies	117	85	230
Financial Management	140	99	120
Business Services	192	95	142

Thus, the Nord/Pas de Calais with an old declining industrial network is below the provinces' average as far as these tertiary activities are concerned.

Rhône/Alpes, with the actually only one "métropole d'équilibre" - Lyon - and the very dynamic Grenoble, presents rather good findings, but as far as financial management and business services are concerned, not quite so good as Alsace. The case of the latter is a very special one, mostly because of the relative autonomy of Alsace due to historical factors.

The old agricultural regions also present some differences due, on the one hand, to the varying degrees of their respective industrialization (Centre versus Bretagne), and on the other hand to what kind of industrialization occurred in the region (see aeronautics in Midi/Pyrénées which is a very dynamic line).

The Mediterranean regions show a superimposition of two kinds of tertiary activities: on the one hand, the tertiary activities which normally characterize the under-developed regions, and on the other hand, very modern and qualified activities such as research centres which, however, cannot always be considered as a positive development for the regional potential, since they are based mostly on migrant rather than local manpower.

#### 4. Present Policy Reactions in the EC Member-States

The aim of this section is to examine to what extent the governments of the EC have reacted to the basic problem discussed in this project. The policy reaction could be direct, either by regionalizing R & D policies or by extending existing regional policy investment schemes to R & D related investment. The policy reaction could also be indirect, namely by promoting in general types of firms which prevail in peripheral regions or by financing types of infrastructure equipment especially lacking in peripheral areas.

Given the limited evidence of interregional innovation and diffusion differentials, it is not surprising that the governments have not reacted very openly to the problem discussed here. The following section, therefore, does not present an integrated picture of policy progress in a given policy field, but presents information about various policy approaches and directions. The information presently available is not yet sufficient to make summary statements about the state of policy.

#### 4.1 Great Britain: A Framework for an Innovation Oriented Regional Policy

4.1.1 Britain has never established an industrial innovation policy distinct from its more general industrial policies, although the latter have become more technologically oriented in recent years. These industrial policies have led to the piecemeal introduction of schemes designed to resolve perceived operational and technological problems faced by manufacturing industry. As a result, a myriad of bodies and agencies exist in Britain today, ranging in functional terms from the purely advisory to those carrying out pure and applied research; from servicing industry in general to industry in particular; from dealing with all enterprises to aiding only small enterprises.<sup>1)</sup> The majority of these schemes have no explicit aim to provide additional aid or attention to industry located in the Development Areas. Although Development Area establishments and enterprises qualify for assistance under most of these national schemes and in addition receive aid under the various regional policy instruments, some of the national schemes seem to have an implicit bias against the peripheral regions. For example, a scheme developed to stimulate the application of micro-electronics in manufacturing industry has involved the setting up of a number of consultancies to advise companies on the possibilities. Figure 7.1 shows the regional distribution of these consultancies and reveals a heavy concentration in London and the South East. This pattern mirrors and will probably reinforce the distribution of significant innovation source described in Figure 6.2.

4.1.2 In the light of such evidence it is not surprising that despite these schemes, many of which have been in operation for some years, the Development Areas are regarded as areas of low innovative record and potential (N.R.S.T. 1977).<sup>2)</sup> Empirical studies at the level of the enterprise, suggest there are certain characteristics and facilities associated with either innovative success or the rapid adoption of new techniques by the firm (see SAPPHO 1972, FREEMAN 1974). The existence of this knowledge suggests a broad framework within which to carry out a realistic study designed to develop an 'Innovation Oriented Regional Policy'. Hopefully a framework developed along these lines may provide a basis for work in, and co-ordination between, a number of national studies which will provide di-

1) For a more detailed description of the numerous schemes consult relevant Department of Industry literature or for summaries of the major schemes available see ROTHWELL and ZEGVELT (1978) or HAGEDOORN and PRAKKE (1979) CAMERON (1979).

2) Northern Region Strategy Team (1977)

rectly comparable results. It also permits the identification of a number of areas for additional research. It may allow the identification of current regional policy weaknesses at later stages of the E.E.C. project.

4.1.3 The framework is set up in the present context of the British economy but could easily be modified to that of another member of the Community. It assumes, that national governments and the Community will not lightly, nor readily, abandon their current national industrial strategies and instruments in the light of the study group's findings and therefore these are included in the framework (East Axis) in Figure 7.2 below. In addition it has already been stated that the majority of these national instruments are available in the assisted regions. This is important because research has also revealed major influences on regional economies which may only be dealt with satisfactorily at the national or even E.E.C. level. Of importance too, is the recognition that certain instruments of regional policy appear to have been successful in raising levels of employment and investment in Development Areas. These instruments would presumably be retained if thought viable in the future. Even those instruments that are of uncertain value may not be quickly removed. It therefore seems correct to add the current regional policy instruments to the framework on the Southern axis. In certain instances regional policy will "top-up" national instruments; in other words, it will act independently of national instruments. On the West axis are those characteristics associated with technological success at the plant level. Finally, the characteristics of the industrial establishments in a particular region are illustrated on the Northern axis.

4.1.4 The framework sets the existing manufacturing plant in a region (Northern axis) within the context of a set of plant characteristics generally associated with innovative and imitative performance (West axis) and the particular national and regional instruments available to encourage or aid the plant to become innovative, or increase its innovative or imitative performance - (East and South axes). The plant in a particular region therefore has a reference plant and a set of instruments available to help it achieve successful innovation.

4.1.5 In theory, then, management at a location wishing to innovate may evaluate the strengths and weaknesses of their establishments vis-a-vis the reference plant. Assistance to overcome any observed weaknesses is

sought and aided by the national and regional schemes. For example, managers at a plant which has production and technological strengths may recognise weaknesses in marketing. They can then search the various schemes at national and regional level for advice and/or aid to help overcome this difficulty. The assistance they receive for their establishment brings it closer into line with the reference plant and increases its probability of innovating/imitating.

4.1.6 This framework exhibits a number of major weaknesses when applied in the real world. Management will not necessarily be aware of the conditions which increase the probabilities of success nor the type or number of schemes available to help them (GREEN 1977). It therefore seems reasonable to suggest that the system requires a catalyst to obtain high levels of reaction. It is envisaged that this catalytic role would be played by an E.E.C. or national agency. Individuals in the agency would approach and encourage management to adopt an innovation policy and evaluate their needs vis-à-vis the reference plant. They would then search within the national and regional policies for the most effective aid to meet the plant's needs and assist local management in obtaining it. At present this role is played to some extent by the Department of Industry in Britain, but a much more dynamic role is envisaged in the future.

4.1.7 A further consideration within this framework is the influence of the multiplant corporation. The framework does not necessarily provide that each plant should possess all the characteristics of the innovating plant, but it should have ready access to them: for example, use of centralized R & D facilities, market promotion and evaluation etc.

#### 4.2 Italy: Present Policy Reactions and Potential Policy Strategies

The changing nature of regional problem in Italy is the focus of the political debate since 1974, even before the new law for the Mezzogiorno was passed.

In this context the following features have been mentioned frequently: regional disparities of innovative and adaptive capacities, the need for technology transfer and the diffusion of innovation, and, in general, the weakness of the present industrial structure not being able to provide the

Mezzogiorno with self-sustained growth.

On practical grounds, however, only few attempts have been made by the government to steer the existing policies in this new direction. Apart from the reactions of the government, other public or semi-public institutions (e.g. chambers of commerce) or even private ones (e.g. association of industrialists) spontaneously made decisions to approach regional problems on a different basis.

Among these other instruments, the Agency for the Promotion of Technological Progress in Small and Medium-Sized Firms of the South, set up by the chamber of commerce in Naples, is worth mentioning.

Finally in 1978, the local government of the Lombardy Region decided to set up an Agency for the Diffusion of Innovation and Technological Transfer.

Given the very short period of functioning, however, information on some of these experiences is extremely poor.

#### 4.2.1 Innovation and Technology Policies

The actual implementation of the Fund for Applied Research established by Law no. 1089, 25 October 1968, is generally considered unsatisfactory.

The major shortcomings are:

- (a) only big firms already operating in the area of applied research actually benefited from the Fund; small and medium-sized firms were the minority of applicants;
- (b) the majority of firms which took advantage from the Fund were located in northern regions, despite the fact that 40 % of the Fund was reserved to the South;
- (c) technology transfer and diffusion of innovation were not considered by the Fund.

During the period 1968-1977, the Fund financed 628 projects out of 963 presented by firms (335 were either refused or withdrawn by applicants). Lombardy alone accounted for more than 42 % of the total projects financed. The principal explanation for the small number of projects financed in the Mezzogiorno is the incapacity of local firms to perceive the need for



investing in research (i.e. lack of "demand" for - rather than supply of - applied research is the crucial point).

After 1974, when 40 % of the Fund was reserved by law to southern firms, the situation apparently improved: in 1975, 23 research projects to be undertaken in southern regions were presented, compared with only 21 projects presented in the whole period 1968-1974. The presenting firms, however, are multiregionals with R & D activities located in their northern headquarters, and in fact the type of research they want to undertake in the Mezzogiorno is characterized by a very low level of difficulty and risk. After completion of the projects, no new laboratory had been founded in the Mezzogiorno.

#### 4.2.2 Industrial Policy

The recent law for industrial restructuring (Law no. 675, 12 August 1977) has, among other objectives, that of promoting the formation of special agencies (in the form of consortia) whose task it is to provide managerial advice to small and medium-sized firms in the South (Art. 19). Furthermore, the same law devoted a share of the Fund for Applied Research to technology transfer and innovation diffusion (Art. 10) and appointed CIPI (Interministerial Committee for Industrial Policy) to pass specific provisions for its implementation. The CIPI approved these provisions only in spring 1979 (29 March 1979); an evaluation of the actual implementation of this policy is therefore not yet possible.

#### 4.2.3 Regional Policy

The current Mezzogiorno law (Law no. 1183, 2 May, 1976) introduced incentives for establishing or developing centres for scientific research, with special emphasis on those directly linked to production activities. According to the provisions passed by CIPI in May, 1977, as centres for scientific research must be considered either independent institutions or laboratories fully integrated in individual firms or consortia of firms, in both cases on condition that they employ more than 20 people. The main purpose of the research centres above defined must be:

- the discovery of new products and/or the improvement of those already existing;
- the discovery of new processes and technologies and/or the improvement of those already existing;

- the discovery of new processes and technologies and/or the improvement of those already existing;
- the discovery of new areas for the utilisation of processes and/or technologies already existing;
- the development of results of researches performed in other centres and laboratories.

Even in this case, no detailed information on the actual implementation of the policy is yet available.

#### 4.3 Denmark

The main objective of the regional incentive policy has been to reduce unemployment and increase wages and the general service facilities of the assisted areas.

The main rationale is that the manufacturing industry is the leading economic factor and that incentives should be used to relocate these activities from the densely populated regions to the assisted areas.

However, due to the fact that these regional policies are strongly investment and production oriented, it could be argued that the existing regional policies have mainly influenced the location of production plants or production-intensive companies, and consequently have offered principally the redistribution of blue collar employment.

Furthermore, all types of tertiary activities (except for some hotel projects) have not received any incentives at all.

In a society with low mobility in general and still with great regional disparities in the distribution of innovative and managerial activities (and many other kinds of "tertiary" activities) within manufacturing industry as well as the service sector, the existing investment and production oriented incentives will not be sufficient.

On a national scale there has been a substantial extension of programmes for technology and innovation services to the companies.

It should be noticed that all stages of the innovation process except for fundamental research are well covered (i.e. applied research, development, production of O-series, marketing and distribution).

Whether some of these national policies have a regional impact is hard to tell; however, it should be mentioned that two programmes from the Council of Technology might have some regional impact. These are:

- (1) The establishment of a technological information service network in Denmark with service centres all over the country.
- (2) From 1977-1979, there have been special programmes (partly regionalized) for small firms (less than 50 employees) covering many kinds of management, product development, marketing etc. activities.

Up to now there have been no policy reactions concerning the traditional regional policies. The existing law is from 1972 and only small changes in the delimitation of the assisted areas have taken place since then.

Based on the previous discussion, there is a need for a new set of regional policies:

In the long run more indirect measures are needed to improve the indigenous potential of the backward regions. In this connection the development of infrastructure and decentralization will be key words. Developing an urban structure in the peripheral areas with centres of sufficient size to be attractive to innovative/tertiary activities, will be important. Furthermore, decentralization of public decision making and improving of the educational, communicational and technological infrastructure of these regions will be of great importance.

To improve the spatial distribution of innovation activities in the short run some more specific measures might be brought into consideration. Some of these should be oriented mainly towards the stimulation of the establishment of new firms and expansion of existing ones, and others should be oriented towards influencing relocation of firms or departments of firms. For small new firms, initial costs are of great importance and, furthermore, barriers of uncertainty and risk are significant. For these kinds of firms, measures towards covering initial costs and in general reducing risk will be of relevance. However, in order to influence relocation of innovation activities, it

is probably necessary to design measures influencing the operating conditions of these activities in the peripheral areas. It is important that these measures are oriented towards the early stages of the decision making process and that they are attractive from an operating point of view, because relocation costs are of small importance for many such activities.

#### 4.4 Ireland: Present Policy Reactions and Potential Policy Strategies

##### 4.4.1 Traditional Regional Instruments

The Irish authorities consider that their conventional industrial policies - notably the New Industries Programme and the Small Industries Scheme - have a significant impact upon innovation: major R & D facilities may be subsidized under the New Industry Programme. The Small Industries Scheme contains special provisions for supplying technical and managerial services to promote innovations in small firms. This programme is regionalized - as is the New Industry Programme - with grants of up to 60 % for buildings and machinery in Designated Areas and 45 % in Non-Designated Areas. Only a small proportion of the funds allocated to these two programmes is directly oriented to innovation projects. The general industrial development programme emphasizing export-led growth is assumed to have innovative side effects, although innovation is not the ultimate objective.

##### 4.4.2 Innovation and Technology Policies

During the 1950's and early sixties innovation was regarded as a benefit directly yielded by industrial policies. Stronger innovative capacity and technological development of the Irish economy began to be viewed as an end in itself in the late sixties, and this was given material expression in 1969 by expanding the Institute for Industrial Research and Standards (IIRS) and charging the IDA with the responsibility of funding R & D activities.

It might appear somewhat anomalous that much of the industrial growth in Ireland has occurred in sectors which are research based and are associated

with high proportionate expenditures on R & D in advanced economies: electronics, healthcare products, intermediate and related chemicals, high technology synthetic fibres, mechanical engineering and sports and leisure equipment. This rapid growth in science-based exports has not been founded upon any comparative advantage created by Irish science (COOPER and WHELAN, 1973, p. 26). Product and process innovations have largely been effected by intra-company transfers from abroad. Economic objectives account for about 78 % of R & D expenditure and agriculture is responsible for 45 % of this total (COOPER and WHELAN, 1973, p. 22). The typical form of Irish R & D financial allocations is brought out by the fact that the 45 % of economically oriented R & D is located in a sector (agriculture) which accounts for about 17 % of GDP, whereas the industrial sector - which is normally the relatively science-intensive part of the economy - accounts for 35 % of GDP but only 42 % of R & D expenditure (COOPER and WHELAN, 1973, p. 22). The considerable expansion of industrial output and exports which took place up to 1969 occurred without a commensurate change in the proportion of R & D funds devoted to industry although there was some absolute growth in these resources<sup>1)</sup> (COOPER and WHELAN, 1973, p. 23).

The degree of concentration of R&D expenditures is decreasing: in 1967 20 companies accounted for 70% of expenditures; by 1974, 20 companies were responsible for 55.7% of R&D spending (MURPHY and OHUANAIGH, 1975, p.34). This trend probably reflects the influence of IDA Product and Process Development Scheme.

#### Specific Policy Instruments

- (1) The Institute for Industrial Research and Standards (I.I.R.S.) was established in 1946 and has three major objectives (O.E.C.D. 1976)
- (i) to provide technical advisory services to industry;
  - (ii) to provide technological support for industrial firms attempting to grow and/or introduce radical changes.
  - (iii) to provide viable investment opportunities in technology to firms committed to grow in Ireland.

The I.I.R.S. will take responsibility for intramurally developing new technology at all stages of the innovation process except production. A team of technical liaison advisers maintains contact with companies to determine their needs. The IIRS and its policies are operated upon an aspatial basis, but the Institute, in addition to its major base in Dublin, has facilities at Shannon and is being established in Cork.

1) There is no comparable data available for the past decade.

(2) IDA: Product and Process Development Scheme.

The IDA has been empowered since 1969 to grant funds for R & D projects conducted by manufacturing firms. There are three distinct sets of policy instruments by which the scheme is implemented:

- (i) specific R & D products;
- (ii) grants for industrial R & D facilities, and
- (iii) the Naas Research Park.

(i) Specific R & D Products.

Projects which have as their primary objective the development of new or improved industrial processes or products are considered for grant assistance of up to 50% of the approved cost covering labour, salaries and wages of technical staff, equipment and materials used for development; consultancy fees and sub-contracting work. These grants are not regionally differentiated and some 900 projects have been approved since 1970.

(ii) Grants for Industrial R & D Facilities.

This complementary policy provides maximum grants of 35 % in designated areas and 25 % elsewhere for the establishment of R & D facilities within manufacturing concerns. Expenditure incurred on site and site development, buildings and services and plant and equipment are eligible for grant aid. It has already been shown in 2.2.1 of the Irish Report that peripheral agricultural regions share of R & D grant payment was below their share of national manufacturing employment in 1977 and 1978: the positive effects of these programmes disproportionately favour the semi-industrialized and core region.

#### 4.4.3 Small and Medium-Sized Firm Policies

It has already been reported in the Irish Report that the IDA Small Industries Scheme (which is regionalized) has special provision for supplying technical and managerial services to promote innovations in small firms. Projects assisted under the programme can employ up to 50 persons with a fixed asset investment of up to £300,000. Two-thirds of the projects backed under the Small Industries Programme are from established firms putting forward proposals to expand the output of their present products and diversify into new product areas. In this way it has been

I.D.A. policy to upgrade skills and products and to move the firm gradually towards more advanced technology and wider markets.

If the hypothesis being advanced as the central one of this research project is valid, then the Irish Government will need to allocate greater resources to stimulate innovation and adoption in manufacturing industry, especially in development areas. In particular, a greater scale of financial aids might be introduced in order to stimulate more major R & D work in the Irish industrial sector; more attention might be devoted to the question of promoting the diffusion of innovations from overseas companies to the rest of the economy; policies could be developed to speed up the adoption of new innovations by small and medium-sized indigenous firms in peripheral areas; and continued encouragement for joint ventures and licensing arrangements will also help to speed up the diffusion of new innovations.

#### 4.6 Germany

##### 4.6.1 General Remarks

For an evaluation of the policy situation in Germany with respect to inter-regional differences in the innovation and adaptation potential one has to distinguish

- 2 levels of government: federal and state government policies, as well as
- 3 policy areas: regional policy, innovation and technology policies and special policies for small and medium sized firms.

The distinction between the two levels of government is important for several reasons. Normally, the central government takes a national perspective, while the state governments are more sensitive to specific regional problems. This does not necessarily imply that the federal government stays out of the field of regional policy. If regional problems in general or of a specific region reach dimensions too large for state governments, the federal governments, pressured by large political constituencies, steps in. The crisis in the coal and steel area of the Ruhr or common problems of all development areas normally find policy reactions on the national level. The state governments are not per se strong-holds of regional policies because most states include at least one dominating agglomeration. Thus, the state governments are just as involved in the basic conflict between the large and dynamic agglomerations, the problem-ridden coal and steel areas and the small-town based assisted areas. The state governments, however, are closer in spatial and mental terms to specific problem regions often react more quickly and flexible and are much better equipped institutionally to implement policies which require a high level of cooperation between the state and the firms and plants of problem regions.

##### 4.6.2 Characteristics of the National Industrial Policy

The German MIP Report shows that the German regional policy system (GRW), which is planned jointly by the federal and the state governments and administered by the second level of government, has not specifically reacted to the new economic situation of the seventies. This system was concerned more with preventing an excessive reduction of employment by weak firms in problems areas than with actively speeding up the innovation and



diffusion process in peripheral areas. It is not unfair to say that much of the investment steered to peripheral regions in the past years has been in the area of low risk investment in mature technologies and mature markets. The share of capital (rather than human capital) intensive investment in branch plants has been just as high as in the other European countries. In terms of the diffusion process all this could mean that regional incentives aim at late rather than early adoption of new technologies and therefore does not fulfill the function strengthening the potential of problem regions to enter new and growing rather than mature markets.

The national technology policy, on the other hand, has for many years concentrated exclusively on high technologies, high risk products and new markets. An analysis of this policy shows that large firms, large technologies and large agglomerations received a disproportionately large share of technology funds.

The Federal Government, therefore, introduced a package of instruments to aid specifically small and medium-sized firms. This system includes:

- R & D personnel incentive scheme (300 million DM p.a.)
- R & D investment grants (1.5 million DM p.a.)
- First-innovation subsidies (20 million DM p.a.)
- External research grants (10.5 million DM p.a.)
- Risk capital programmes
- Regional technology and innovation advice agencies
- The share of funds of high technology aid programmes which goes to small and medium-sized firms has recently increased from 5 to 12 % of a total sum of 1.3 billion DM p.a.)

Most of the state governments have recently introduced additional R & D policy programmes. Design and implementation procedures tend to direct these aid systems at the very small firms (150 employees) and small projects which escape federal policies. The implementation is more decentralized, closer to the firms and supported by more intensive technology and managerial advice and information transfer systems.

Most of the federal or state aid systems are not regionalized by design. For most instruments the regional distribution of applications and grants, the effectiveness in different regions etc. is not known. For some policies the German Report (Sections 3.5.4.3, 3.5.4.5, 3.5.4.6, 3.5.4.10) show that the regional distribution of grants has been improved and that state governments have a higher score on this issue than the federal government. The bias in favour of the large metropolitan centres, however, is still present. The federal government is only about to start a research programme where the following questions are being asked:

- To what extent does the design of these instruments cause an unequal distribution of government aid in favour of the core regions of Germany?
- To what extent do (overcentralized) implementation features work against the interests of problem regions?
- To what extent does the local environment of a firm (prosperous urbanized core region, highly urbanized coal and steel region, peripheral areas) support or limit the effectiveness of technology policies?

Without bringing an explicit regional dimension into R & D policies for small and medium-sized firms, governments seem to believe that they reach the full (regional) spectrum of firms the more they fulfill the following conditions:

- On the firm level technology policies should not only promote research and development, but also the translation into markets and production, since it is here where the most serious financial problems arise for small and medium-sized firms.
- Technology policies should not be limited to the R & D intensive innovation processes, but pay more attention to the many firms which innovate in the ongoing production process.
- On the macro economic level the diffusion rather than the innovation process and the early rather than the late adopters of new technologies should be aided.

More empirical evidence for interregional differences in the innovation and diffusion process will certainly be required before the German governments will regionalize in a systematic way innovation policies or give a strong innovation or diffusion accent to regional policy.

#### 4.7 Netherlands

##### 4.7.1 Present Policy Situation

The general reaction of both the Dutch government and Dutch politicians following the 1973/74 depression has been to apply more, much more of the same. Rather than questioning the effectiveness of the various instruments, regional policy was "strengthened" by increasing the number of subsidised centres and by stepping up investment premiums.

The most recent Dutch government memorandum, outlining regional policy, dates from February 1977 (Nota Regionaal sociaal-economisch beleid 1977-1980). As its name indicates, the planning period for policies announced in it, is the four-year period 1977-1980.

A new government memorandum, which is to cover the 1981-1984 period, is now (fall of 1979) being prepared. It is likely to be published sometime during 1980. As the budgetary consequence of changes in government policies have to be discussed within the cabinet at an early stage (in order to make these consequences compatible with those arising from other ministries' proposed policy changes), the Ministry of Economic Affairs, which prepares the new memorandum, must already have a fairly clear idea of what it wants regional policy to become in the early 1980's. Judging regional policies solely on the basis of the 1977-1980 memorandum therefore does not do full justice to current government thinking on regional problems. One also has to keep in mind that a long looked-for government memorandum on innovation policy will be published during the fall of 1979. There definitely will be links between this and the new regional-policy memorandum.

In recent years there has been a revival of interest in the role of small and medium-sized enterprises. Apart from non-specifically economic "small is beautiful" arguments, this in part is a result of the recognition that SMEs in the past have been responsible for a disproportionately large share of major innovations. While large firms often have the resources to develop innovations into mass products, small firms, despite the disadvantages that come with their small size, tend to be more innovation-oriented.

Just as there is a firm-size dimension, there might also be a regional dimension in innovation-promoting policies. For one thing, this may result from different large firm/small firm-ratios in various regions, for another because national policies have regionally varied results for other reasons. Finally, and most importantly for the subject under discussion, innovation and technology policies might be "regionalized" intentionally.

A survey of Dutch instruments shows that the latter is the case for only a very few instruments. Only the IPR R&D incentive and the activities of the regional development companies can be said to be truly regional innovation instruments. A few other instruments contain regionalized elements (PI-project and some of the Investment Account Act allowances).

The majority of instruments, however, have no specific regional dimension. As opposed to this, quite a number of innovation-promoting instruments are specifically devised to aid small and medium sized firms. We pointed out earlier that assisted areas might benefit from innovation stimuli directed at SME's. But, although the Dutch assisted areas will have a lower large firm/small firm ratio than the Randstad, it does not follow that these assisted areas will benefit more than proportionally from SME-directed incentives. If SME's are spread evenly over the country, Randstad-SME's in all likelihood would still be the more innovative ones and therefore would be making more use of incentive schemes.

#### 4.7.2 Potential Policy Strategies

The unavailability, at the time of writing, of the 1979 Government Memorandum on Innovation prevents us from giving an up-to-date survey of government policies (or intended policies) on innovation. Furthermore, regional policy for the early 1980's is now in its formative phase. In discussing potential policy strategies towards the mobilization of the regional indigenous potential one therefore might not do justice to policy changes already being considered, or even changes that will be shortly implemented.

The main forms of government influence on technical innovation have been classified in five categories:

1. Government demand;
2. R&D subsidies and other forms of direct financial support to firms;
3. Laws or regulations, affecting the provision of a service, or the sale of a product;
4. Support of the scientific and technological infrastructure;
5. General economic climate.

It is evident that demand historically has been the most important way in which governments have influenced innovation. The least important way has been through subsidies. Government regulation has not prevented or delayed innovation to any significant extent and may indeed have had a substantial stimulating influence. Infrastructure support also has made a major contribution. The foregoing conclusions are based on an assessment of 50 major clusters of technical innovation in the 20th century<sup>1)</sup>, and therefore say more about what actually turned out to be important than what also could have been important. To make the point clear; in those cases where innovations were begun without government subsidies, the latter instrument will get a low or zero score as contributing factor. This does not imply, however, that government subsidies would not have had a positive influence, had they been available.

Nevertheless, there are other reasons why instruments such as government demand or government regulations should be preferred over subsidies. The main one is that governments may tend to finance commercially second-best projects, that, once the government is committed, will be more difficult to stop than commercial projects. So, if governments do become financially involved it might be wiser to allocate funds towards reinforcement of the (regional) scientific and technological infrastructure. This would leave - apart from measures directed at improving the multi-interpretable "economic climate" - three major categories:

- (i) Infrastructure
- (ii) Government demand
- (iii) Laws and regulations

---

1) The current international economic climate and policies for technical innovation, Report prepared for the Six Countries Programme in Government Policies towards Technological Innovation in Industry, by Science Policy Research Unit, University of Sussex, U.K., in collaboration with Staffgroup Strategic Surveys TNO, The Netherlands, November, 1977.

It is necessary to point out some of the regional dimensions of innovation policy <sup>1)</sup>. First of all, it should be realised that from an international point of view, the Netherlands is more likely to be an adopter than an innovator. The reason for this would not be specific lack of innovativeness, but rather lack of size. Market areas required to exploit major new innovations will be larger than the Netherlands as a country can provide. So even where innovations originate from Dutch firms (Philips being a prime example), those firms will look for larger markets.

By the same reasoning, it would appear to be true that adaptation lags between the Randstad firms and firms outside the West will be rather short. Much of the Netherlands actually lies within the sphere of influence of the Randstad. Even though the assisted areas would have less to offer in terms of an "innovation climate", innovations first adapted in the Randstad would not take long to reach the assisted areas, especially if one considers branch plant connections with headquarters locations. Yet with this dispersion model in mind, the assisted areas would always be the dependent party. They would derive a large part of their growth from activities, initiated and controlled elsewhere. The only way out of this seems to lie in the creation of concentrations of innovation and adaptation potential in the assisted areas, applying the instruments proposed by Hillege. The regional argument in innovation policy really is a spatial concentration argument. Such concentrations could act as alternatives to firms for Randstad locations.

It follows that the number of such non-Randstad centres would have to be very limited. Regional policy would have to focus on those cities, that by their present conditions, would have most innovation potential. Policy would have to start from the strong points of a region, not from its weak ones. Points of strength would be:

- a) the presence of a scientific infrastructure;
- b) the presence of regional development companies;
- c) the presence of a highly-qualified labour force;
- d) the presence of clusters of firms that engage in what in the Dutch context might be called "spearhead activities".

---

<sup>1)</sup> J.J. VAN DUIJN, De betekenis van een innovatie-georiënteerd regionaal beleid voor Nederland, Beleid & Maatschappij, 6, 1979, pp. 162-71

## 5.0 Policy Implications

### 5.1 General Remarks

We noted in the previous section that regional policy does not sufficiently cope with the increased importance of innovation and diffusion for regional growth processes. This does not mean that this topic has remained undiscussed so far. While most European governments have tried to find a remedy by installing innovation promoting policies mainly at a national or state level, the German Government made a first step towards a reorientation of traditional regional policy strategies by stimulating several research projects on the regional effects of research and development policies, as well as on the possibilities of an innovation oriented regional policy (EWERS, WETTMANN et al. (1980); ELLWEIN, et al. (1980).<sup>1)</sup>

The European Commission has moved much more quickly. On the one hand, the Commission has supported research investigating the regional dimension of the innovation and diffusion process. On the other hand, the Commission has - parallel to the research mentioned - drafted a set of regional policy packages for the development of Belgian, British and Italian steel regions, British shipbuilding regions in the Mezzogiorno, and French and Italian regions, which will be affected by the enlargement of the European Community in the 1980's. All five policy packages include innovation and technology policy instruments (COMMISSION OF THE EUROPEAN COMMUNITIES, 1979) and if these policy proposals are representative of a new generation of regional policies in the EC, it would seem that the innovation or technology aspect has been firmly established in European regional policy long before regional research has really proved the case.

In this chapter we shall deal with three policy aspects. Firstly, we shall elaborate five institutional options open to governments to integrate an innovation oriented regional policy into the industrial policy system. Secondly, a crude typology of regions will be developed, for each of which a separate strategy will have to be developed. Thirdly, policy criteria for a strategy to assist the indigenous small firm sector of peripheral regions will be presented.

---

1) Cf. also Ewers, H.-J., and Wettmann, R.W., (1980).



5.2 Policy Options

In principle, governments have five different institutional options for the design of an innovation oriented regional policy. The following table (Table 5.2.1) gives a summary picture of the situation in the EC member states with respect to the five strategies described here:

Table 5.2.1 The Use of Strategic Option in the Member States of the EC

Policy Strategies/Countries		B-L	DK	D	F	Irl.	I	N	UK
(1) Innovation-oriented regional policies		-	-	+	-	-	+	-	-
(2) Regionalization of national R&D policies			+	-	-	+	+	-	-
(3) National policies with calculated regional side effects			-	+	-	-	-	-	-
(4) Regionalized implementation of national R&D policies				+			-		
(5) Sub-national innovation policy instruments	incentives	-	-	+	-	-	-	-	-
	consultancy agencies			+	+	+	+		+

- (1) The first institutional option would be to institutionalize an innovation-oriented regional policy within the traditional regional policy system. In practice this could, for instance, mean that regional policies, instead of granting general investment incentives, might develop instruments to subsidize investment for new products or new production technologies. An advantage of this option would be that it would facilitate the close coordination of traditional regional policy instruments with the new type of policies. A disadvantage would be that the institutional know-how of the regional policy systems with respect to

the intricate problems of the innovation and technology diffusion process is generally very limited. This could work in favour of a second option.

- (2) This second option could be based on a regionalization of existing national R&D incentives in terms of a spatial differentiation of rates for clearly delineated problem regions. The advantage of this option would be that the institutional framework of R&D policies possesses important experiences concerning the promotion and transfer of technological know-how which would be difficult to develop in the regional policy institutions. A serious disadvantage would be that R&D policies in most of the EC member-states have traditionally focused on highly advanced large-scale technologies and on large corporations as recipients of government aid. Implementation procedures have therefore been highly centralized on the national government level. The understanding of the problems of small and medium-sized firms, especially if located in peripheral regions, has so far been very low in the R&D policy system. The reluctance of R&D policy makers to regionalize their instruments, e.g. by introducing special regional rates for incentives, will always remain very high since it may seriously complicate the policy system and require a very detailed knowledge of the regional dimensions of the innovation and diffusion process. Some of these problems could be reduced by a third strategy.
- (3) National R&D policies could be designed to have calculated regional side-effects, e.g. by focusing on specific industries (textile, steel, shipbuilding, etc.) which concentrate in individual assisted areas. Sectoral strategies of this type to solve regional problems have been widely used in EC member-states in the past. They can only be utilized, however, where regional problems clearly can be traced back to a sectoral problem (monostructured regions); often sectoral R&D policies prevent rather than promote what is most needed in monostructured or other types of lagging regions: a diversification based on a broad technological modernization.

- (4) The fourth option would be based on the hypothesis that implementation procedures rather than design features are the decisive factors in determining the regional effectiveness of technology policies. In some European countries the observation has been that national R&D policies, which have been increasing quickly in number over the last few years, favour the highly industrialized and urbanized regions and neglect the more peripheral areas. This may suggest two important aspects of R&D policies. On the one hand, public institutions designed to implement R&D policies and to organize the technology transfer tend to be more numerous and better equipped in the central than in the peripheral regions. On the other hand, firms located in peripheral areas often show, due to the limitations mentioned in section 4, a lower capacity to make full use of national R&D policies than comparable enterprises in the large metropolitan centres. This is partly due to deficiencies in the local environment (e.g. lack of complementary business services), and partly to the internal characteristics of these firms (innovation behaviour, frequency of external contacts etc.). Implementation procedures and institutions therefore play a much higher role for the successful public promotion of technological processes in peripheral than in central regions. The strategic goal of an innovation-oriented regional policy could in this context be to strengthen the implementation process of national R&D policies in the assisted areas rather than attempting to regionalize these policies or to develop a whole set of new regional policy instruments.
- (5) A fifth institutional option available in some governmental systems would be to decentralize to sub-national levels of government the formulation and implementation of those components of R&D policies which are of special importance for small firms. This option is based on the assumption that the indigenous small firm sector in many problem regions seems to be the only relevant target group for an innovation-oriented regional policy, since, on the basis of present knowledge, policies which induce large multi-site corporations to relocate headquarter functions to peripheral regions are very difficult to implement. To institutionalize a strategy for the indigenous small firm sector on the level of sub-national governments rather than on the national level seems to have important advantages. In Germany most

of the eleven state governments have developed R&D policy systems competing with or complementing national policies. The experience shows that at the state level the specific needs of peripheral areas and of small firms weigh much more heavily than at the national level, that state policies tend to be more diffusion than innovation and research oriented, and that small firms more readily accept public R&D assistance from regional than from national governments. On the other hand the German experience also shows that highly agglomerated problem regions dominated by heavy industry and large corporations (e.g. coal and steel regions, shipbuilding regions) require the full weight of national R&D policies if a technological modernization is to be achieved. The decentralization of R&D policies for the small firm sector to sub-national levels, of course, is not open to highly centralized states.

The five institutional options cannot be considered as equivalent alternatives. Characteristics of the governmental system and the nature of the regional problem in the respective country may suggest one or the other option or some combination of them. Whatever institutional option will be preferred, there exist a number of common problems and criteria which all policy concepts or strategies would have to observe. The policy problems and criteria formulated below will therefore indicate general directions, rather than detailed prescriptions for the design of an innovation oriented regional policy.

### 5.3 A Regional Typology

The most important distinction to be made refers to the type of problem region affected by a slow take-up of new technology. In the very crude typology put forward below, we distinguish between four different types of problem regions in order to illustrate the different emphases of policy strategy and implementation procedures which might be appropriate in the different circumstances. This classification should not be regarded as rigid; many regions combine features of more than one of the types des-

cribed and the appropriate strategy might similarly combine features of the strategies described.

- Highly urbanized regions characterized by heavy industry, e.g. coal and steel or shipbuilding regions such as the Ruhr area, Lorraine, West-Central Scotland.
- Peripheral, less-urbanized problem regions dominated by externally controlled branch plants, e.g. Scotland, Mezzogiorno.
- Peripheral problem regions characterized by locally-based small and medium-sized independent or subcontracting firms, e.g. Toulouse area, Upper Franconia.
- Agricultural regions without industrial base.

The barriers to technological change in the first type of region do not seem to result from a lack of centrality or agglomeration size. Geographical distance or low density of information cannot be considered as causes for the slow take up of industrial innovations. The main problem in these regions seems to be twofold. On the one hand, the supply of human capital as well as of information on new technological and market developments tends to be homogeneous rather than diversified due to traditional monostructure in these regions. On the other hand, regions characterized by heavy industry suffer from a petrification of their socio-economic system and from a bias against innovative developments. One reason for this could be that industrial, banking, or regional and local government institutions as well as labour union organizations in these areas are predominantly large in comparison to other types of regions. A second characteristic of these areas is that all those public and private organizations which serve the industrial sector have adjusted most of their activities to the special needs of large industrial firms. The same applies to the existing infrastructures in these regions. In such a socio-economic system, the dominance of vested rights and the fact that services delivered between the different organizations are tailored to serve mainly large "customers" may tend to suffocate new developments, experiments, high risk behaviour etc. If industrial monostructure and socio-economic petrification together explain the lack of innovativeness of the Ruhr, Lorraine, Newcastle or Pittsburg regions, the design of an adequate innovation strategy may become extremely difficult even for a strongly interventionist government: it may require a virtual destruction of well-established organizational networks,

cartels of vested rights, mental barriers, physical structures etc., before a promising innovation strategy can be started.

A second, quite different problem is posed in those rural problem regions where the industrial texture is largely characterized by externally controlled branch plants or formerly autonomous firms which in the meantime have lost their independence by takeovers and mergers. This type of problem region might be called "externally controlled". The innovation problem here might result from three characteristics: physical (i.e. not only mental) distance due to peripheral location, lack of diversified labour market and information density or diversity due to the low level of urbanization, and lack of indigenous growth potential (which could be developed by public policy) due to external control. The last characteristic mentioned seems to be the decisive one for the design of an innovation-oriented regional policy. The main target of an adequate strategy in this case must be on the one hand the creation of new indigenous firms within the problem region, and on the other hand, the decentralization of headquarters functions such as R & D, marketing, financial operations etc. from the centres of decision-making of the multi-plant firms outside the assisted region to the branch plants or formerly acquired local firms. Both approaches seem to be very difficult. The creation of new firms tends to be restricted by the lack of local entrepreneurial potential, local business services, banks and qualified labour. These deficiencies are to some extent caused by the fact that branch plants and non-locally owned firms generally do not depend on local business services, information networks, markets for risk capital or qualified personnel, or that they exploit these markets, if at all extant, to the exclusion of small or new local competitors. The decentralization of headquarters functions does not seem to be an easier task for public policy. While the French government has in recent years attempted to grant IDC-like investment permits to multiplant firms for investment in the Paris region only in return for the decentralization of headquarters functions to the provinces, the use of incentive instruments for this purpose has not been demonstrated so far. On the other hand, a growing number of studies have drawn attention to the need for some public control of the regional implications of takeovers and mergers (e.g. LEIGH and NORTH, 1978), and it would seem that some sort of control would be a necessary concomitant for an innovation-oriented regional policy.

More promising seems to be a strategy of government promotion of technological change in the third type of region. While physical distance from the large metropolitan centres and lack of agglomeration potential remain essential problems, the presence of autonomous, regionally-based plants and small firms provides an indigenous potential of catalysts for innovation and a potential market for business services, qualified labour and innovative information. Both factors are essential preconditions for a successful take-up of government stimuli by any problem regions.

The fourth group poses a totally different problem. Apart from improving agricultural production, there are only two routes open for indigenous development: food industry based on the local agricultural products or, in some cases, tourism. Both types of activities, however, require entrepreneurial potential which is often lacking in these regions. While technological progress in food industry is considered to be rather slow the formation of an industrial food production sector in an agricultural region is a major development step which requires social, organizational, managerial and technological innovation processes. Because of the complex and simultaneous nature of such a development, it is a particularly difficult task for regional policy.

#### 5.4 A Potential Policy Strategy: Policy Criteria

A policy strategy for these regions would have to be designed according to the following criteria:

- (1) The regional innovation strategy should be clearly directed at small and medium-sized firms as the most important target group. OAKLEY (1979, p.341) has pointed to the fact that "technological change for small firms is in many ways a far less traumatic process, due to a more modest scale of operation and greater market adaptability". This explains why, given the limited management capacity of most regional policy systems, a regional innovation policy limited to small and medium-sized firms would seem to be more easily manageable for regional policy makers. The inclusion of large multi-plant corporations, on the other hand, would require a very different strategy in a different institutional framework.

(2) Given the very stable locational disadvantages of peripheral regions, one would not expect the centres of innovation to move from the large metropolitan areas to these regions. In addition, the majority of small and medium-sized firms cannot be considered as potential producers of very new technologies. The policy aim should therefore be to integrate these firms into the diffusion process at an early point in time. While many of these firms may today be classified as "late adoptors" of new technologies, public assistance may help these firms to become "early adoptors" of innovations produced somewhere else. This requires that the policy does not primarily focus on the technological research process, but on the integration of new technologies into the existing production process or of new products into the market, and that the "model" firm for such a policy is not a research intensive firm with a specialized R&D department, but what one might call a "shopfloor development" firm.

(3) A third essential element of a regional innovation strategy would be that it is demand rather than supply oriented. By this we mean the following. Several governments in the EC have in recent years begun to establish data banks and information networks to supply industry with new scientific and technological information. Often these systems are organized on a very large scale, covering as many technological areas and industrial sectors as possible. With respect to the specific needs of small firms, these information supply systems suffer from two shortcomings. Firstly, to offer an information system which is nearly complete with respect to technology and market information is extremely difficult, given the large variety of goods produced and technologies utilized by small firms. Secondly, and this seems to be much more important, information supply strategies have little effect if small firms are unable to gather, screen and process the information offered and to implement new technological concepts in the production and marketing process. The aim of any regional innovation strategy should therefore be to raise the desire of small and medium-sized firms to be informed, to increase their inquisitiveness and their propensity to draw upon the sources of information available to them. The aim should also be to increase firms' ability to search for information effectively, to sift information, to absorb that which is relevant and to act upon it - all aspects of what we call "information behaviour".



Table 5.4.1 Supply/Demand Classification of Policies

	Supply oriented	Demand measures
Financial aids for:		
- employment of R&D personnel		+
- R&D investment		+
- external research		+
- marketing studies commissioned by firms		+
- management consultancy agencies		+
Establishment of technology information systems	+	
Establishment of polytechnical schools	+	
Improvement of telecommunication systems	+	
Establishment of public risk capital banks	+	

(4) If this is to be achieved, a demand strategy must emphasize the importance of advisory systems compared to traditional incentive systems used so widely in industrial policy. The important point is that if the technological change process is to be improved, little help can be expected from immediate cost alleviations for small firms. The aim must be to improve persistently the quality of indigenous firms with respect to innovative behaviour, search processes, management styles etc. While higher costs for risk capital, qualified personnel, technologically advanced production processes and more extensive marketing may justify government incentives, nevertheless they ought to be combined with advisory schemes, since the range of business services available to small firms in peripheral regions is often very restricted (to tax consultant and non-specialized lawyers).

It must be acknowledged in passing that most European countries have a long record of efforts to promote productivity by consultancy and other educational means, dating back at any rate to the distribution

of Marshall Plan funds. Just how successful or unsuccessful these endeavours have been, we are in no position to tell; but the situation is now such that an attempt to bring new life into strategies of this sort, ensuring that the means employed are completely up with the times, is fully warranted.

There is, however, an important difference between the earlier productivity movement and the aim of an innovation-oriented regional policy. Productivity gains resulting from process innovations or other improvements are still a very important objective and may secure markets and employment for certain periods. Since many of the goods produced in problem regions, however, are based on mature technologies and produced for mature markets, productivity promotion may only be a transitory strategy, given the increase in international competition from low labour cost countries. This would require a regional innovation strategy which not only promotes process innovations, productivity and the profitability of today's production program, but also attempts to ensure a higher rate of product innovation for tomorrow's production. For while process innovations have a tendency to reduce employment by substituting capital for labour, at least in the long run, product innovations rather tend to open new markets and create new jobs. They are therefore of first rate importance for the development of problem regions.

(5) The study of EWERS, WETTMANN et al. (1979) suggests that, while the main bottlenecks of small firms in peripheral regions can be found in the area of human capital, information provision, management quality and risk capital, it will not be possible to predict for specific groups of small firms (classified by sector, region or other criteria) specific innovation bottlenecks. This requires that a regional policy system designed to promote the technological process must be multi-functional or complex enough to be able to respond quickly and in a flexible way to the variety of functional deficits or combinations of it which might come up in any specific case. The technology aspect in a narrow sense is only one relevant aspect among others. Purely technology-oriented incentive, information, or advice systems will therefore not be very effective.

(6) A further implication of the emphasis on a demand strategy is that an innovation oriented regional policy must be delivered very close to the firm. The reason for this is that many of the factors important in the innovation process touch upon very sensitive internal characteristics of private firms (attitudes, information behaviour, management styles etc.) and can hardly be understood by central government institutions nor brought to the firms. The German experience has been that small firms are very reluctant to contact national government agencies responsible for technology policies, while they show much more readiness to cooperate with state government institutions. On the other hand, the national government seems to be unable to handle the large number of cases which would be required to make regional policy in the field of technology very effective. Policy experience in Germany shows that to successfully implement a policy for small and medium-sized firms, the proper implementation of that policy might even be more important than the instrument design itself. While the implementation requires a high degree of decentralization to regional institutions, it also needs the involvement of new types of intermediary agencies for the delivery of public policies to private firms. This is necessary to reduce the mental distance which normally exists between public agencies and private firms, to make the implementation of a new type of policy more effective and to protect small firms against too direct government interference.

5.5. EC Policy Measures: Proposals

5.5.1. Reorientation of Regional Investment Incentives (ERDF)

Pursuant to the ERDF regulation, the proportion of the fund which is subject to quota is used to aid the capital needed for financing investment projects. To the extent that these funds are used to stimulate (private) industrial investment, the ultimate goal is to improve the employment situation in development regions by increasing the rate of new job creation or the maintenance of existing jobs.

The basic assumptions and findings of this study suggest that in the 1980's , interregional and international competition will be largely influenced by the rate of adoption of new technologies and the capacity to produce human capital intensive, high quality goods and services. This requires definite criteria and quality standards for the jobs to be created in development regions.

In view of these criteria, the present regional incentive schemes in the European Community do not seem to be satisfactory. Two aspects of these schemes have to be emphasized in this context.

Firstly, most of the incentive schemes fix the amount of aid given to the investor according to the volume of planned investment. Regional aids therefore tend to favour enterprises using capital intensive production technologies.<sup>1)</sup> Capital intensity, however, is not necessarily a lasting relative advantage of industrial production in Europe vis-à-vis the newly industrialized nations. Capital intensive investment, therefore, may not guarantee the long term stability of underdeveloped regions within the EC.

A second aspect of regional incentive schemes in the EC is that in some countries (e.g. Germany), regional investment aids are conditioned toward the creation of a specified number of new jobs or the maintenance of existing jobs by the investor. It may be one unintended result of this condition that, given the risk and long term commitment involved in the creation of new jobs, investors tend to create these new jobs only if they produce for mature and riskless markets on the basis of a developed and risk-free techno-

---

1) cf. Allen et al. (1979)

logy. Some regional investment incentives in the European Communities may therefore implicitly suffer from a conservative technological bias. Jobs created by them tend to produce goods which are in late phases of their product cycle rather than in new and growing markets, and which therefore do not guarantee long-term stability.

In response to these problems the ERDF could take the initiative and promote the human capital and technology aspects of industrial investment in developing regions. This could be achieved by using ERDF funds for topping up national incentive systems, thereby putting a premium on human capital intensive or technologically advanced investment. This would require that selection criteria and procedures be developed which help to identify investment projects eligible for national development grants, and which in addition fulfil certain human capital or technology requirements for ERDF funding.

By such a topping-up system the European Community could put emphasis on the qualitative aspect of employment creation, while national incentive schemes may still continue to foster quantitative goals. Eventually the EC initiative could induce national or regional governments to re-design their regional incentives in a similar fashion. Finally, the degree of additionality of ERDF aids could be better secured than under the present system, if the ERDF eligibility and rate setting criteria were more selective than the national decision criteria.

#### 5.5.1.1. Human Capital Criteria

For the decision whether or not to award a grant, and at what rate, decision criteria have to be designed to operationalize the concept of human capital intensity. Adlung and Thoroe<sup>1)</sup> have recently proposed three different indicators to determine the value of the investment grant (per newly created job).

The first indicator proposed by Adlung and Thoroe relates to the salary and wage sum per employee. The grant (per job created) would then be determined by average wages paid for the newly created jobs.

---

1) Adlung and Thoroe (1980), p. 17 seq.

The grant (g) for the setting up, extension or modernization investment of the enterprise j would then be:

$$G_j = R \sum_{i=1}^n W_{ji} L_{ji}$$

Where  $W_i$  = weekly (monthly) salary per employee in wage group i

$L_i$  = number of employees in wage group i

R = rate of award/grant sum in percentage of average weekly or monthly wages.

One problem with this indicator may be that wages and salaries are not only paid in relation to human capital, i.e. training, level of qualification or know-how, but also with respect to working conditions or location.

In order to measure the human capital intensity in a more appropriate way, and to avoid regional or locational bias, a second indicator has been proposed. It measures on the firm or establishment level the wage differential between the lowest wage group and the higher salary groups<sup>1)</sup>.

The corresponding formula to determine the grant (g) would then be:

$$G_j = R \left( \sum_{i=2}^n W_{ij} L_{ij} - W_{1j} L_{1j} \right)$$

( $W_1$  and  $L_1$  represent wages and number of employees in the lowest wage group).

In order to avoid data problems with respect to wages or salaries on the level of firms and establishments, and in order to prevent the manipulation of wage rates by individual firms located in assisted areas, the indicators could be based on industry-specific rather than on firm-specific wage structures. The formula would then be:

$$G_j = R \left( \sum_{i=2}^n \bar{W}_i L_{ij} - \bar{W}_1 L_{1j} \right)$$

( $\bar{W}_1$  and  $W_1$  are average wages per industry, not per firm or establishment).

---

1) The wage differential can become quite meaningless, if through collective bargaining the lowest wage groups have been pushed up relatively higher than the other wage groups.

A similar proposal is presently being discussed in the German regional policy system. The objective of this proposal is to give preferential treatment to the creation of jobs characterized by low investment costs and high wages or salaries. This would be one way to subsidize jobs related to research and development or management functions.

The most serious problems with these proposals for relating investment subsidies to a human capital indicator are the following:

- The data presented by the investor concerning the human capital characteristics of the new investment must be very carefully scrutinized by the public decision-making body. The procedure here can be very similar to the ones employed for existing non-automatic regional grants, where the firm has to propose the project and present all the necessary information concerning technical and market aspects.
- An administrative control system may be required to secure the maintenance of jobs associated with the subsidized investment over a number of years, if not for the life-time of the investment. Otherwise, the intended effect of the once-and-for-all payment made to the firm may be easily reduced by the post-payment behaviour of the enterprise.

#### 5.5.1.2. Innovation Criteria

Problems with the practical use of human capital indicators<sup>1)</sup> to determine eligibility and rates of award for ERDF grants could lead us to explore a second route for developing the qualitative aspects of the European Committee's regional policy efforts. ERDF funds, or parts of them could be reserved for those assisted area investment projects which are needed to produce new and technically advanced products.

The philosophy behind this is that regional policy in the past has often subsidized the manufacturing of products (in branch plants), the production of which had become too expensive in the non-assisted areas and had already reached a high level of standardization. These products were often in the

---

1) For a detailed discussion of these indicators see Adlung and Thoroer 1980 p. 5 seq.

late phases of their life cycles and serving mature rather than expanding markets. Employment quality and stability therefore did not tend to be very high.

The employment creation aim of regional policy should result in the approval of ERDF grants for investment in new and technologically advanced products rather than for modernization and rationalization investment. While investment for new products tends to create new employment, often with long term prospects, rationalization investment tends to substitute capital for labour rather than to create new jobs. Implicitly, investment for new products also modernizes the production technology, since new products usually require technologically advanced production techniques and processes. In practice, investment for new products will often be difficult to separate from investment for process innovations. As a general guideline, however, a new-products-over-new-processes rule should be established for ERDF grants.

The main problem with ERDF aid to investment in employment sources associated with the production of new and technologically advanced products would be the setting up of a selection mechanism to identify those projects eligible for national regional policy incentives which also qualify for ERDF criteria. While regional policy systems do not attempt to evaluate investment projects under these qualitative criteria, national innovation and technology policy systems have developed a number of devices to determine the innovative content of investment projects. Committee or refereeing procedures of various kinds have been used over many years and could be adapted to regional policy needs.

While innovation standards would be very difficult to quantify and to harmonize on the EC-wide basis, it appears appropriate if, in the context of a regional investment of employment creation policy, project selection would occur according to regional needs and in the institutional context of a sub-community level selection procedure.

In view of the total ERDF or the quota section funds involved, one must understand that the net effect on the reduction of regional disparities in the European Communities can only be minor. An important function of the ERDF could therefore be to fulfil a lead



or pioneer function in the development of regional policy rather than financing operations which, in principle, can be fully subsidized by national regional policy incentives.

The proposed reorientation of ERDF investment incentives would not create a general overlap between regional and technology policy. In the macro-economic innovation process the principle domain of industrial policy is in the field of the so-called first-innovators and high-technology firms, while regional policy efforts aim rather at firms which exploit and adapt technological innovations. On the micro-economic level, technology policy promotes mainly research and development, engineering and design, as well as prototype development. The production phase, where most of the investment normally takes place, and the later phases of commercialization are not within the domain of R&D policy. Regional policy, on the other hand, has always put the emphasis on facilitating the production phase rather than the early phases of the innovation process. This traditional division of labour would be maintained by the proposals to redesign ERDF investment incentives.

Incentives to renew the production programme of an enterprise have been included in regional incentive programmes of several member states of the EC. German incentive statistics, however, show that only 5% of industrial investment associated with regional incentives can be classified as investment to renew the production programme or product mix of a firm.<sup>1)</sup> The reason for this could be that the renewal of a firm's product mix differs from enlargement or replacement investment in that it requires a complex set of decisions and information gathering processes concerning new technologies, markets and market risks, promotion and innovation management problems. Financial aids for a product mix renewal in the past, however, have been offered to firms without the complementary provision of management and technology advice. ERDF aids to product innovation and product mix renewal should therefore be linked with technology and management assistance in order to make these aids more effective.

---

1) Cf. Bundesamt für Gewerbliche Wirtschaftsstatistik der Gemeinschaftsaufgabe "Verbesserung der Regionalen Wirtschaftsstruktur" for the period 1972-1978, Eschborn (1979)

## 5.5.2 Human Capital Assistance

In recent studies investigating regional or local barriers to technological innovation and diffusion, the human capital factor has been identified as a crucial bottleneck hampering structural change and technological development in peripheral regions. Two potential ERDF initiatives should be proposed here.

### 5.5.2.1 R&D and Management Personnel Subsidies

To avoid valuation, screening and post-payment control problems of once-and-for-all payments to subsidize human capital intensive investment, the EC could stimulate a regional scheme offering grants to retain R&D or management personnel in SMEs.

The scheme could either consist of

- repetitive annual payments on the basis of last year's salaries for personnel with specific qualifications or certificates or of
- granting the firms loans which are reduced on an annual basis by the salaries or wages of such personnel (or a given percentage of salaries and wages).

To avoid a continuing subsidization, the grant scheme could be limited to a three or five year period, or the loan could be calculated on the basis of a three or five year salary. The EC scheme should be limited to small enterprises with less than 200 employees, perhaps allowing for variations of the size structure of firms between the EC member states.

Since regional policy efforts should not be directed at the small number of research-intensive high technology firms, but rather at the large number of potential adoptors of new technologies which often do not possess specific R&D divisions but concentrate on shopfloor innovation during ongoing production, R&D personnel subsidies should not be limited to full-time R&D personnel, but should require only that the employee allocates a minimum of 300 to 400 hours per year to R&D related activities.

The rate of assistance should be fixed at 20 to 40% of R&D or management related wages of the preceding year and should be limited to a maximum sum. It could be expected that the personnel subsidy would make the employers more aware of the human capital problem, and the firms in peripheral regions more attractive. It is to be expected that after a three or five year period, the qualified personnel would be firmly integrated into the enterprise and that the employer would see the need to continue the employment of qualified personnel.

Experience with a non-regionalized R&D personnel scheme in Germany shows that such a subsidy is readily accepted by smaller firms, and that the administration of such a policy instrument is simple in terms of decision criteria (rates of award, eligibility) and can easily be implemented by a non-governmental organization.

#### 5.5.2.2 Training in New Technologies

In this study, a general reluctance to advocate direct ERDF aids to SME's has been expressed. This applies in principle to investment as well as to the wage subsidy scheme proposed in paragraph 5.5.2.1.

An alternative route for the EC toward development of the human capital quality in peripheral assisted regions could be to finance special vocational training programmes in new technologies (e.g. micro-electronics) in assisted areas. While personnel subsidies or human capital criteria for investment grants help to increase the demand for qualified labour, vocational training programmes act on the supply side. This aspect is particularly important, given the low level of diversification of peripheral labour markets and the reduced public and private training facilities for qualified labour in peripheral regions.

The EC programme could be designed as an experimental programme in which the EC finances only the investment needed to carry out vocational training in new technologies. This investment would

mainly concern technical installations rather than buildings. The grant should be given under the condition that the vocational training programme be developed in co-operation with regional representatives of small and medium-sized firms to serve the special needs of this clientele. It should also be specified that the training concentrate on technologies which apply to a wide spectrum of industries and product lines and can contribute to a diversification process in the assisted regions.

#### 5.5.2.3 Trainee Programmes

While the training programme proposed in paragraph 5.5.2.2. is directed at the qualification process of unqualified and specialized labourers, the trainee programme proposed here is intended to increase the supply of engineers and management personnel for small firms in peripheral regions.

A recent German study<sup>1)</sup> shows that while small firms in peripheral regions often possess a stock of experienced and qualified labour with mechanical and electro-technical training, they lack engineers and university trained management personnel. While firms of similar size in highly urbanized regions not only profit from a more diversified labour market, but also have access to the qualified research personnel of polytechnical schools, whom they can employ in a part-time arrangement, firms in peripheral regions often do not even succeed in keeping graduates of local polytechnical schools within the region.

It would therefore appear useful to promote trainee programmes which allow senior students, graduates or research staff members of local polytechnical schools to work full or part-time for a one or two year period in technical or managerial functions of small local enterprises or in consulting firms or agencies serving those firms.

Salaries for the trainees should be fully or partly paid by public funds established with local polytechnical schools. It can be

---

1) Ellwein et al. (1980)

expected that the trainee will be either fully integrated in the firm or receive a training which will qualify him for an activity in another small local firm. Thus the programme could help to prevent the emigration of young and highly qualified labour to the central agglomerations.

### 5.5.3 Improvement of Regional Information and Consultancy Infrastructure

While the proposals put forward in section 5.5.1 to 5.5.2.1 are intended to improve the effects of direct ERDF aids to firms, it is argued here that the main emphasis of EC regional policy efforts should be directed at improving the regional infrastructure necessary to help the innovation and diffusion process in assisted areas.

There are three arguments in favour of the policy priority established above.

- Recent studies investigating small firm needs in the innovation process show that financial factors are not the only or even the most important barriers for small firms to adapt to structural change and to adopt new technologies and products. While high-risk capital or long-term capital for financing product development and diversification of product lines have been identified as important scarcity factors, the following non-financial aspects of the innovation process seem to be at least of equal relevance:<sup>1)</sup>
  - technical and market information
  - management and planning capability on the firm level
  - human capital.

Financial aids can stimulate the readiness and improve the capacity of small firms to demand these factors. In peripheral regions, however, small firms suffer from a lack of supply of information, business services and human capital. While local or regional supply of these factors is often lacking, supply

---

1) Arthur D. Little (1980)

on the national level is too remote to be taken up and exploited by small firms in peripheral regions.<sup>1)</sup>

Since market forces do not provide these factors on the local or regional market or not at a sufficient level to meet the needs of small firms, regional policy has to establish the infrastructure necessary to provide within the peripheral regions the relevant human capital, market and technology information, and management services.

- By concentrating on the development of an institutional infrastructure rather than on direct aids to individual firms, the ERDF activities will have a more lasting and widespread effect on assisted areas than the subsidization of individual firm activities.

Since technological change and innovation represent a highly complex problem for small firms, it would be almost impossible to decide or control on the level of the EC whether a given firm is more in need of financial aid for external contract research, technical feasibility or risk evaluation studies, or any other information or consultancy input. There seems to be a widespread consensus that small firms in peripheral regions would require a large package of financial and non-financial aids for innovative activities. The selection or combination of instruments for each specific case, however, would require a close co-operation between the firm concerned and a consulting and information network within the region.

Since peripheral regions vary considerably in terms of level of economic development, sectoral and size structure, labour market and information conditions, only regional institutions appear able to identify special needs of SME's within their regions. Often the identification of these needs cannot be achieved on the basis of public statistics, but rather requires permanent contact with firms located in these regions.

---

1) Ewers, Wettmann et al. (1980)  
Ellwein et al. (1980)

Any attempt of the EC to single out specific aspects of the innovation process as a case for ERDF funding may miss the most serious bottlenecks in specific assisted areas. Proximity to the firm, personal "dialogue", and face-to-face interaction would seem to be absolutely necessary for the organization of an information and management know-how transfer process.

- Public, semi-public and private consulting agencies on a decentralized level could finally serve to help to implement national technology and innovation policies. Recent studies in Germany show that national technology policies tend to favour the dynamic, highly urbanized regions.<sup>1)</sup> The reason for this is that due to specific policy criteria and administrative procedures firms in peripheral regions are less willing and able to apply for and effectively use national incentive schemes in the area of innovation and technology policy.

By creating an institutional infrastructure in the assisted areas which helps to advise local firms not only on managerial, technological and market problems, but also on the availability and utilization of technology policy instruments. Regional innovation agencies could thereby indirectly improve the implementation of national technology policies in those regions which, in the past, have often been disadvantaged by those policies. Regional implementation in this sense can be considered as an alternative to a regionalization (e.g. regionally differentiated rates) of national policies, which often proves to be very difficult to achieve.

#### 5.5.3.1 Practicable Initiatives of the European Commission in the Establishment of Innovation Centres

Technology transfer agencies, information and management assistance institutions and market research services have been set up in recent years in many regions of Europe. In some countries, (e.g. Germany and France) assisted areas are still disadvantaged in this respect in comparison to the non-assisted and central regions of Europe.

---

1) Recker (1979)

The EC should make a special effort to improve the organization of the transfer process of technical-organizational know-how to assisted areas.

- by studies identifying those assisted regions in the EC where the organization of public, semi-public and private business services is still very deficient;
- by financial assistance for the planning and setting-up (initial investment) of innovation and management service centres in the most deficient regions;
- by organizing an exchange of information between regions with similar economic structures on problems of technology transfer and innovation; and
- by offering assistance for technical installations in these centres which should be available in all peripheral regions such as easy-to-use computer terminals giving access to international data bases, or by subsidizing initial personnel costs necessary to adapt these technical installations to the needs of local firms.

Since assisted areas in Western Europe vary largely in terms of level of economic development, economic structure, comparative advantages and special problems in the technical-organizational innovation process, no single concept can be proposed which applies to all assisted regions. The study and planning of a regional institutional infrastructure in assisted areas would therefore have to occur on a case-to-case basis. The European Commission could, however, by use of financial incentives, draw the attention of these conceptual studies and planning efforts to the following points:

- Innovation centres established in recent years tend to specialize in the transfer of technological information, thereby neglecting management and marketing aspects of the innovation process.
- The one-sided emphasis on technology transfer tends to produce process rather than product innovation (however artificial this distinction may be). While the modernization of the production technology of assisted areas is an important factor for their



competitiveness on a national and international scale, modernization of the product mix is often even more important. If too many products produced in a region have come into the late phases of the product cycle, the renewal of the production programme becomes necessary. For this renewal process market information and management know-how is more important than for the renewal of production technology.

- Product innovation seems to be of particular importance for monostructured regions where diversification is a necessary strategy and cannot be achieved by modernizing production technology for existing product lines.

#### 5.5.3.2 Assistance to Polytechnical Schools

In accordance with the general principle expressed in this study (i.e. that an EC regional innovation policy should not rely primarily on direct financial aids to firms in the form of investment incentives or specific technology push programmes), additional proposals are made to improve the local infrastructure relevant to the innovation and diffusion process.

In several countries, proposals have been put forward to establish

- independent or

- university related research centres

in peripheral regions. In terms of regional policy objectives, the actual effect of these research centres on the indigenous sector of assisted areas is rather minor because

- (University related) research centres tend to focus on the R&D phase of innovation while the majority of small firms in peripheral regions are rather adoptors of new technologies than innovators in a narrow sense and adopt and improve new technologies in the ongoing production process rather than in a research and development process separated from production (shopfloor versus laboratory innovation).
- Research centres tend to co-operate with large corporations rather than with small firms because neither the framework of

thinking nor the time rhythm of research institutions and the average small firm can be easily matched.

- Local research centres therefore tend to "export" their results and services rather than to apply them within peripheral regions.

Instead of relying primarily on existing universities and government laboratories, regional policy efforts should rather be based on technical and polytechnical schools. In general these schools have a more practical (rather than academic) orientation, they are more suited to cope with day-to-day problems of small firms and to act as intermediaries between these firms and research institutions. The following practical EC initiatives can be proposed:

- The EC could give experimental funds to teaching programmes, research units and manufacturing advisory services in polytechnical schools aimed at the specific management, marketing and technology needs of small firms in assisted areas.
- A special trainee programme organized in the context of polytechnical schools has been proposed above.
- Polytechnical schools could be stimulated by EC incentives to develop teaching programmes for vocational schools focusing on the technical and social aspects of important new technologies (e.g. micro-electronics).

The special emphasis we put on human capital formation efforts in this report is based on recent studies which show that

- Technological progress is widely slowed down by a shortage of skilled people (e.g. shortage of software experts) and by rising prices for skill in software preventing the rapid spread of micro-chip technology.<sup>1)</sup>
- The introduction of modern technology (automation, communication technology) can no longer be linked to production activities in a narrow sense, but rather requires a simultaneous modernization of construction and design technology, work planning, handling, storage, quality control and distribution technology. This aspect of industrial modernization puts a special burden on the technical/organizational integrative capacity of small firm management and

---

1) Barron (1980)

human skill in all areas of firm activities.<sup>1)</sup>

- Modern technology is not easily accepted by workers who are afraid of job consequences, or by production engineers who are afraid of consequences for the basic organization of the production process, the layout of their factory, for reliability of production, etc.

Given these problems, peripheral development regions are disadvantaged by a lack of diversified labour market, because of the conservatism of the local labour force, and because of the conservative methods for industrial and labour relations management.

#### 5.5.4. Promotion of Venture Capital

Technology and innovation policy has in many countries had a high interest in the promotion of venture or high-risk capital institutions. Regional policy has so far made few efforts to support venture capital provision.

The policy problems posed in the context of the two policy systems seem to be quite different. While technology policy is interested in promoting advanced technology based firms, regional policy's interest is rather aiding the broad range of indigenous firms which are for the most part adoptors rather than first-innovators of new technologies. Especially in peripheral regions the venture capital problem is different from the more central regions because of the special characteristics of the commercial banking system in these areas.

In general, the commercial (or semi-public) banking system is neither capable nor willing to finance innovative and risky investment projects of small firms because, firstly, they are often biased in favour of larger corporations and secondly, because they normally base credit worthiness on assets and past performance rather than on long-term prospects of new investment projects. Banking personnel usually are not trained to evaluate investment projects in terms of market and technology aspects and of human capital and management quality of

1) PROGNOZ - MACINTOSH (1980)  
IFO-ISI-INFRAEST (1980)

the firm. They also lack the skill to screen a wide range of small firm projects, often a costly procedure.

One major problem for commercial banks to evaluate innovative investment projects stems from the fact that human capital and management quality of a firm is not reflected in the balance of accounts. Therefore they cannot be evaluated as assets of a firm which determine the long term prospects of the enterprise and of individual projects.

An additional difficulty arises from the fact that the costs for R&D experimentation and market testing cannot be easily allocated between requirements to maintain the firms existing position and the requirements for innovative activities. Innovation investment will often be allocated to current output and be treated as 'current cost'. This will be the case particularly in small firms where most of the innovative activities occur in the course of ongoing production (shopfloor improvements) rather than as a separate R&D and investment process (laboratory innovations).

Venture capital institutions at a national or sub-national level in the past have not been able to have major effects on the development of assisted regions. They are few in number, centrally located and small. Therefore they do not allow for the proximity and continuity of contacts with small firms in peripheral regions required for the evaluation of innovative investment projects at least in terms of the human capital and management quality associated with it.

In the context of regional policy, the problem of venture capital should therefore be considered as one which must be handled regionally or locally. Since the commercial banking system is decentralized and accessible to small firms, efforts should be made to make local and regional banks more responsive.

We therefore suggest that the European Commission initiate a thorough study of the conditions under which

- the staff of local commercial banks could be trained in the evaluation of innovation projects,

- the screening and evaluation of innovation projects could be done by local banks in co-operation with public or semi-public innovation centres engaged in the implementation of innovation and technology policies,
- the ERDF could support the provision of venture capital by commercial banks and venture capital institutions by investment guarantees, low cost credits or other schemes.

First efforts to incorporate the local banking system into a system of venture capital financing has been made by the State government of Baden-Württemberg. The objective has been to create awareness of the problem among local banks, and to initiate co-operation between the banking system and the State technology consulting system. It does not seem to be clear whether co-operation with local banks or with local branches of national commercial banks would be more promising. While national commercial banks in general apparently have a stronger industry orientation, decision-making is often centralized. Local banks, on the other hand, often lack understanding of the financial problems of modern industry. However, they do have close and continuing contacts with local enterprises, and therefore may be better suited to evaluate the entrepreneurial and human capital qualities of indigenous firms.

#### 5.5.5. Technology-Specific Assistance to Industry

The authors of this study have been extremely reluctant to recommend to the EC the promotion of specific technologies by direct subsidization (in the context of regional policy) of individual innovation and investment projects in industry.

Technology push programmes using this technique have been widely used by national technology policies. The German Ministry of Research and Technology alone directly subsidizes industrial investors in twenty two technological key areas ("Fachprogramme").

Recent studies show, however, that only two technology areas will have a major direct effect on the employment situation in the eighties:

microelectronics and information technologies.<sup>1)</sup> While direct employment effects will be minor for producers of machinery, appliances and instruments, major effects will have to be expected for users of microelectronic equipment in industrial production, in the office sector of manufacturing industry, and in public and private services.

Since all firm functions or activities such as research, development, design, production planning and production per se, material handling, storage and transport, distribution, and administration, will be affected, those regions will be disadvantaged which lack a highly diversified labour market and which show a shortage of software specialists and of business services.

National policies for promotion of the diffusion of microelectronics, information and communication technologies often do not sufficiently penetrate peripheral regions. It is therefore proposed to the EC as a political, not as a financial strategy, that together with the national governments, the need for technology promotion programmes in assisted areas in the two key technologies mentioned (microelectronics and information/communication technology) be investigated. This applies to the use of these technologies in production as well as in the development of the technical infrastructure.

On the basis of this study, national or subnational governments should be urged by the EC to put technology-specific promotion programmes into effect in the two key technology fields. These programmes should be adapted to the industrial structure of the regions and to the options open for diversification. They should be time-limited and implemented in as close a proximity to the firms as possible. It should be borne in mind that these regional strategies can only be supplementary to national policies, and have to be geared toward technology diffusion rather than innovation in a narrow sense.

These technology specific aid programmes for peripheral problem regions should be built upon a package of instruments such as consultancy, R&D and investment incentives. Since according to recent studies the shortage of software specialists presents the most serious barrier to a rapid diffusion of microelectronics, special training programmes in peripheral regions should urgently be considered.

---

1) Cf. IFO-ISI-INFRATEST 1980  
PROGNOS-MACINTOSH 1980

#### 5.5.6 Controlling the Process of Functional Concentration

A difficult policy problem seems to evolve from the increasing spatial separation of headquarters and routine functions between national core regions and peripheral areas. External control of peripheral regions seems to increase due to acquisition activities of large corporations. Corresponding losses of entrepreneurial and R&D functions in provincial locations have a negative effect on the regional innovation potential. These negative effects are difficult to prevent. Regional policy motives have so far not been an element of merger control. This measure would be difficult to use as an instrument for the control of headquarters relocation, since the relocation may not come but years after acquisition. Improving the technical and managerial quality of small firms may increase the resistance against take-over activities of large corporation. At the same time it may make small firms a more interesting case for acquisition.

A more promising approach may be through incentives (e.g. R & D personnel incentives) for large corporations to decentralise or maintain certain headquarters functions in peripheral problem regions. In some instances it may be possible to link research institutions of provincial conurbations specifically to locally-based firms and thereby to induce potential acquirers to maintain the close relationship and exploit the specialized location advantage for a decentralized headquarters activity.

In principle, however, regional policy seems to be in a difficult position to stop the essentially nonspatial process of industrial concentration for regional motives.

BIBLIOGRAPHY:

- ADLUNG, R. and THOROE, C.S. (1980): Neue Wege in der Regionalpolitik  
Vorschläge zu einer Umgestaltung des regionalen Fördersystems in  
der Bundesrepublik Deutschland. Institut für Weltwirtschaft  
(Kiel Discussion Papers 68), Kiel.
- ALLEN, T.J. (1977) "Transferring Technology to the Firm: A Study  
of the Diffusion of Technology in Irish Manufacturing Industry"  
Working Paper 942-77. Alfred Sloan School of Management, M.I.T.
- ALLEN, K., HULL, C. and YUILL, D. (1978): "Options in Regional Incentive  
Policy". In: Allen, K. (ed.): Balanced National Growth. Lexington (Mass).
- ALLEN, T.J. et al. (1979): Regional Incentives in the European  
Community - A comparative study. Collection Studies, Regional  
Policy series No. 15, Brussels, July 1979.
- AMENDOLA - BARATTA (1978): Investimenti Industriali e sviluppo  
dualistico, Giuffrè.
- BANNOCK, G. (1976): "Smaller Businesses in Britain and Germany"  
Wilton House Publications Limited. London.
- BARRON, C.A. (1980): "All that is electronic does not glitter".  
In The Economist, March 1st.
- BUNDESAMT FÜR GEWERBLICHE WIRTSCHAFTSTATISTIK DER GEMEINSCHAFTSAUFGABE  
"Verbesserung der Regionalen Wirtschaftsstruktur" (1979): Report  
for the period 1972-1978. Eschborn.
- BURROWS, E.M. (1973):
- BUSCA, A. (1973): Caratteristiche Funzionali die centri urbani del  
Mezzogiorno, Giuffrè.
- BUSINESS INTERNATIONAL, (1974): Survey of Foreign Investments in the  
Mezzogiorno, IASM.
- BUSWELL, R.J., and LEWIS, E.W. (1970): "The Geographical Distribution  
of Industrial Research Activity in the U.K." In: Regional Studies,  
Vol. 4, pp 277-306.
- BUSWELL, R.J., and VALLELY, M. (1978): R&D Activity in Manufacturing  
Plants Located in the Northern Region. Occasional Paper Series,  
Newcastle Polytechnic.
- CAFIERO, S. (1976): Sviluppo Industriale e Questione Urbana nel  
Mezzogiorno, Giuffrè.
- CAMERON, G.G. (1979): "The National Industrial Strategy and  
Regional Policy" in D. MacLennan and J.B. Parr (Eds) Regional  
Policy, Martin Robertson, Oxford.
- CARTER, C.F. and WILLIAMS, B.R. (1957) Industry and Technical Progress,  
Oxford.



- CESAN, (1978): Di Chi è l'industria Meridionale, Napoli.
- CLAUSTRE, V. (1975): Dynamismes bancaires et développement régional de l'Alsace, Paris, Prospective et Aménagement.
- CLAUSTRE, V. (1979): "La petite et moyenne entreprise dans la compétition internationale". In Futuribles.
- COMMISSION OF THE EUROPEAN COMMUNITIES, (1979): "Proposals for Council Regulations Instituting Specific Community Regional Development Projects under Article 13 of the ERDF regulation." Com (79) 540 final. Brussels.
- COOPER, C. and WHELAN, N. (1973): Science, Technology and Industry in Ireland, The Stationery Office, Dublin.
- CRUM, R.E. and GUDGIN, G. (1977): Non-Production Activities in U.K. Manufacturing Industry. Commission of the European Communities, Collection Studies, Regional Policy Series No.3.
- DANILOV, V.J. (1969): "The Spin Off". In: Industrial Research 54-58.
- ELLWEIN, Th., et al. (1980): Mittelgroße Industriebetriebe in unterschiedlichen Regionen. Schriftenreihe des Bundesministers für Raumordnung, Bauswesen und Städtebau, O6.O41. Bonn.
- FREEMAN, C., (1971): Report of the Committee of Inquiry on Small Firms. Cmnd. 4811, Technical Report No. 6. H.M.S.O. London.
- FREEMAN, C., (1974): Industrial Innovation. Harmondsworth.
- GODDARD, J.B., et al. (1979): "The Mobilization of Indigenous Potential in the U.K." Report to the Regional Policy Directorate of the European Community by the Centre for Urban and Regional Development Studies. Newcastle.
- GODDARD, J.B. and SMITH, I.J., (1978): Changes in Corporate Control in the British Urban System, 1972-1977, Environment and Planning A, 10, pp. 1073-1084.
- GUDGIN, G., (1978): Industrial Location Processes and Regional Employment Changes. Farnborough.
- HAGEDOORN, J. and PRAKKE, F., (1979): "An Expanded Inventory of Public Measures for Stimulating Innovation in the European Community with Emphasis on Small and Medium-Sized Firms". Apeldoorn.
- JAMES, V.Z., MARSHALL, J.N. and WATERS, N.S., (1979). "Telecommunications and Office Location". Final Report of D.O.E. funded Project, Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne.
- JANSEN, A.C.M., (1972): "Enkele aspecten van het ruimtelijk gedrag van grote industriële concerns in Nederland, 1950-1971". Tijdschrift voor Economische en Sociale Geografie, 63, pp. 441-25.
- JANSEN, A.C.M., (1979): "Some consequences and implications of large Dutch Industrial Corporations for the Spatial Economic Structure of the Netherlands, 1960-1978." June, 1979.

- JOHNSON, P.S. and CATHCART, D.G., (1979): "New Manufacturing Firms and Regional Development: Some Evidence from the Northern Region" In: Regional Studies 13, pp. 269-280.
- JOHNSON, P.S. and CATHCART, D.G., (1979b): "The Founders of New Manufacturing Firms: A Note on the Size of their Incubator Plants". In: The Journal of Industrial Economics Volume XXVIII, No. 2. December 1979.
- LANGRISH, J., et al. (1972): Wealth from Knowledge. London
- LAUTERBACH, J., (1979): "Projektentwurf". Hessische Landesentwicklung und Treuhand Gesellschaft. Wiesbaden.
- LEIGH, R., and NORTH, D.J. (1978a): "Regional Aspects of Acquisition Activity in British Manufacturing Industry, In: Regional Studies, Vol. 12 (1978). p. 227-245.
- LEO, P.Y., and PHILIPPE, J., (1979): "Recession, redéploiement et structures industrielles régionales, Communication faite au colloque de Clermont-Ferrand", In: Redéploiement industriel et développement régional, 3-6 mai, 1979.
- LIPIETZ, A., (1978): "La Dimension Régionale du Développement du Tertiaire" La Documentation Française, In: Activités et Régions, Travaux et Recherches de Prospective, 75. Paris.
- LITTLE, A.D., (1979): "Practicable Ways for the CEC to Enhance Technological Research, Development and Innovation in Small and Medium Sized Industrial Firms by Using or Developing Existing Structures at the National or EC Level or Through Complementary Mechanisms": Phase One Report to The Commission of the European Communities Director-General for Research, Science and Education. Brussels.
- MARSHALL, N.J., (1979a): "Corporate Organization and Regional Office Employment". In: Environment and Planning A, Vol 11, pp. 553-563.
- MARSHALL, N.J., (1979b): "Ownership, Organization and Industrial Linkage: A Case Study in the Northern Region of England". In: Regional Studies.
- MCDERMOTT, P.J., (1977): "Overseas Investment and Industrial Geography of the United Kingdom". In: Area, Vol. 9, pp- 200-207.
- NEWBOULD, G. D. (1970): Management and Merger Activity. Liverpool.
- NORTHERN REGION STRATEGY TEAM (1977): Strategic Plan for the Northern Region (Vols. 1-5), H.M.S.O.
- Nota Regionaal Sociaal-economisch beleid 1977-1980 (1977).
- O'FARRELL, P., (1979): "The Mobilization of Indigenous Potential: A Regional Policy Strategy", Ireland: National Report.
- O'FARRELL, P., (1975): Regional Industrial Development Trends in Ireland, 1960-1973. IDA Publication Series, Paper 1, Dublin.

- PARSONS, G.F., (1972): "The Giant Manufacturing Corporation and Balanced Regional Growth in Britain". In: Area, Vol.4, No.1.
- PRAIS, S.J., (1976): "The Evolution of Giant Firms in Britain". Cambridge.
- PRED, A.R., (1966): "The Spatial Dynamics of U.S. Urban Industrial Growth, 1800-1914. Massachusetts Institute of Technology.
- PROGNOS (1979): Technischer Fortschritt Auswirkungen auf Wirtschaft und Arbeitsmarkt. Untersuchungsbericht. Basel/Luton.
- RECKER, E., (1979): Auswertung der Programms zur Förderung von Erstinnovationen 1972-1978. Bundesforschungsanstalt für Landeskunde und Raumordnung. Bonn.
- ROTHWELL, R. and ZEGVELD, N. (1978): "Small and Medium Size of Firms: Their Role in Innovation", Six Countries Programme on Government Policies Towards Technological Innovation in Industry. T.N.O. Holland.
- SAPPHO, (1972): "Success and Failure in Industrial Innovation. S.P.R.U. Centre for the Study of Industrial Innovation, London.
- SCHOLZ, L., et al. (1979): Technischer Fortschritt: Auswirkungen auf Wirtschaft und Arbeitsmarkt. Gutachten im Auftrag des Bundesministers für Wirtschaft, Bundesministers für Forschung und Technologie und Bundesminister für Arbeit und Sozialordnung, prepared by Ifo-Institut für Wirtschaftsforschung, Fraunhofer-Institut für Systemtechnik und Innovationsforschung, Infratest Wirtschaftsforschung, Munich.
- SCIENCE POLICY RESEARCH UNIT, UNIVERSITY OF SUSSEX, U.K. and STAFFGROUP STRATEGIC SURVEYS TNO, The Netherlands, (1977): The current international economic climate and policies for technical innovation, Report prepared for the Six Countries Programme in Government Policies towards Technological Innovation in Industry.
- SMITH, I.J., (1978): Ownership Status and Employment Change in Northern Region Manufacturing Industry. Discussion Paper 7, CURDS, University of Newcastle.
- THORNGREN, B., (1970): "How Do Contact Systems Affect Regional Development" In: Environment and Planning 2 (1970), pp.409-427.
- THWAITES, A.T., (1978): The Future of R&D Activity in the Northern Region: A Comment. Discussion Paper No. 12, C.U.R.D.S.
- VALEYRE, A., (1978): "Emplois et Régions: La polarisation de l'emploi dans l'espace français". In: Activités et Régions, Travaux et Recherches de Prospective, 75. Paris.
- VAN DUIJN, J., (1979a): "Mobilization of the Indigenous Potential A Regional Policy Strategy - The Case of the Netherlands" National Report.
- VAN DUIJN, J., (1979b): "De betekenis van een innovatie-georiënteerd regionaal beleid voor Nederland", Beleid and Maatschappij, 6, pp. 162-71.

APPENDIX to BIBLIOGRAPHY

- EWERS, H.-J., and WETTMANN, R.W., (1980): Innovation-Oriented Regional Policy; In Regional Studies Vol. 14 pp. 161-179.
- EWERS, H.-J., WETTMANN, R.W., et al. (1980): Innovationsorientierte Regionalpolitik. Bundesminister für Raumordnung, Bauwesen und Städtebau. Bonn.
- FIRN, J., (1975): External Control and Regional Development: the Case of Scotland. Environment and Planning A, Vol 7, pp. 393-414.
- MARTIN, F. u.a. (1979): The Interregional Diffusion of Innovations in Canada. A study prepared for the Economic Council of Canada, Quebec
- MURPHY, D. and O'LUANAIGH (1975): Research and Development in Ireland, 1974. The Stationery Office, Dublin.
- OKEY, R.P., (1979): Technological Change and Regional Development: a note on Policy Implication, Newcastle
- O'FARRELL, P.N. (1978): An Analysis of New Industry Location: The Irish Case, Progress in Planning, 9 (3), Pergamon Press, Oxford.
- O'FARRELL, P.N. and O'LOUGHLIN, B. (1979): The External Linkages of Grant Aided Manufacturing Plants in Ireland. Industrial Development Authority, Publication Series, Dublin.

## STUDIES

published so far in the series

"Internal Documentation on Regional Policy in the Community"

### No. 1 - April 1978

"Cross-border Communications Study for the Londonderry and Donegal Area".  
Summary report. (EN). 28 p.

### No. 2 - April 1978

"Research Study into Provision for Recreation and Leisure in Areas  
affected by oil-related Industry in the Highlands and Islands of Scotland".  
Summary report. (EN). 142 p.

### No. 3 - July 1978

"Stratégie de développement et région rurale.  
Le cas du Sud-Est de la Belgique".  
Rapport de synthèse. (FR). 104 p.

### No. 4 - August 1978

"The Transfrontier Commuters in Europe".  
Summary report. (DA,DE,EN,FR,IT,NL). 41 p.

### No. 5 - October 1978

"Relocation of Economic Activities traditionally located in the  
Copenhagen Area".  
Final report. (EN). 225 p.

### No. 6 - November 1978

"La desserte aérienne interrégionale en Europe".  
Résumé du rapport 1ère phase. (FR). 52 p.

### No. 7 - January 1980

"The Role of the Tertiary Sector in Regional Policy".  
Summaries of the national reports and of their comparative study.  
(DE,EN,FR). 95 p.

### No. 8 - February 1980

"La desserte aérienne interrégionale en Europe".  
Résumé du rapport. (FR). 78 p.

### No. 9 - December 1980

"Europeans and their regions. Public perception of the socio-economic  
disparities : an exploratory study".  
(DA,DE,EN,FR,IT,NL). 62 p.

### No. 10 - September 1981

"The Mobilisation of Indigenous Potential".  
Final report. (DE,EN,FR). 22 + 142 p.

### No. 11 - September 1981

"An Appreciation of Regional Policy Evaluation Studies.  
A comparative study". Final report. (DE,EN,FR). 123 p.

---

The abbreviations after each title indicate the languages in which the  
documents have been published :

DA = Danish, DE = German, EN = English, FR = French, IT = Italian,  
NL = Dutch.