



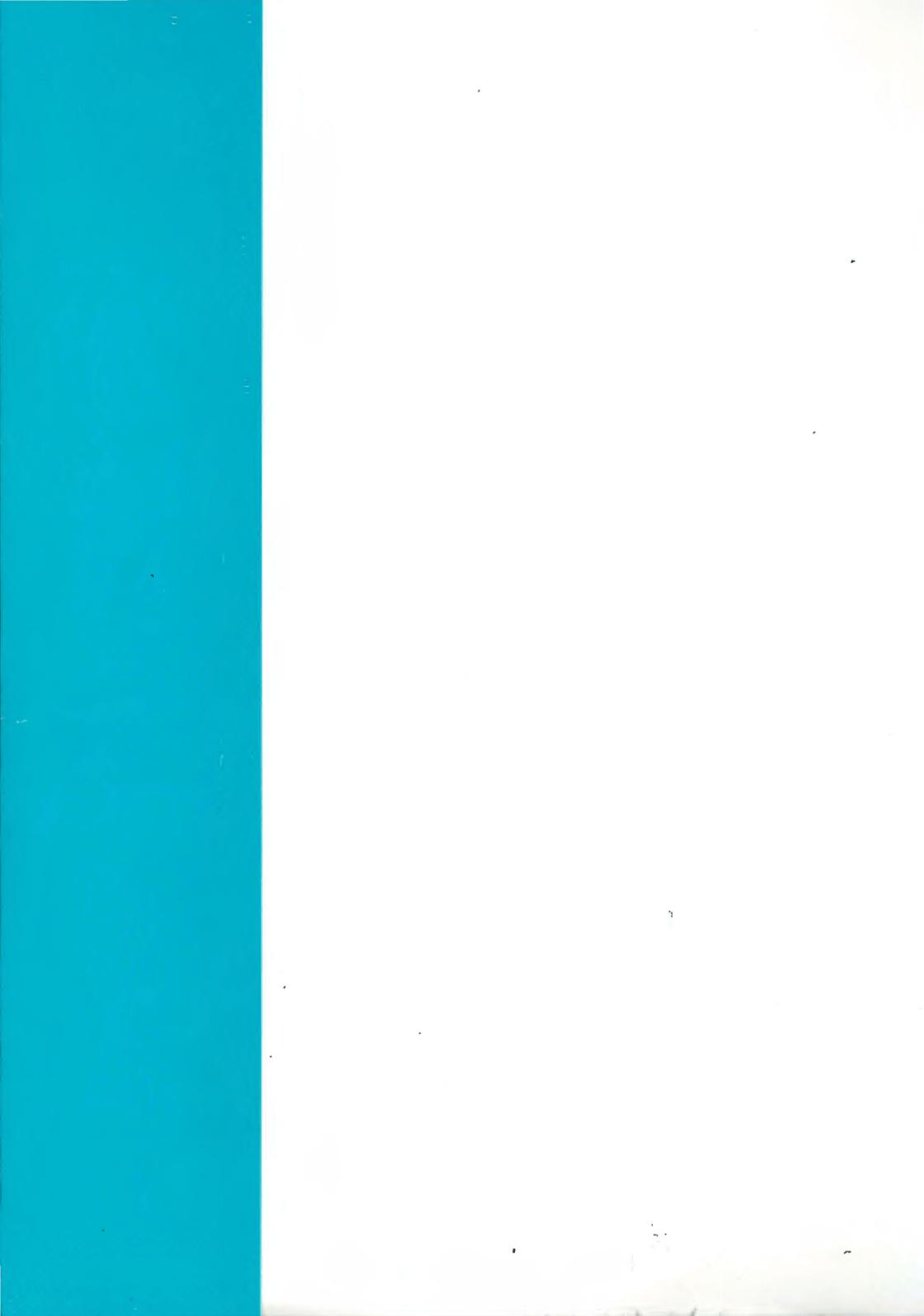
**POLISH ACADEMY OF SCIENCES
SYSTEMS RESEARCH INSTITUTE**

**STRATEGIC
REGIONAL
POLICY**

**A. STRASZAK AND J.W. OWSIŃSKI
EDITORS**

PART I

WARSAW 1985



SYSTEMS RESEARCH INSTITUTE
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STRATEGIC REGIONAL POLICY

Paradigms, Methods, Issues and Case Studies

A. Straszak and J.W. Owsinski
editors

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PART I

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III. TECHNOLOGICAL AND SCIENTIFIC ISSUES

INFORMATION AND REGIONAL DEVELOPMENT

Rolf H. Funck, Jan S. Kowalski

Institute of Economic Policy and Economic Research,
University of Karlsruhe, Federal Republic of Germany

1. INTRODUCTION

A distinct shift of viewpoints in considering the role of information in urban and regional development has occurred in recent years: While, during the seventies, the economic-technological content of information, the degree of access to it and the spatial patterns of information flow have been predominant as objects of research, in the early eighties the advent of new communication technologies has moved to the center of analytical interest (Funck, Kowalski, 1984).

Under the first approach, spatial access to innovation has been recognized as the most important factor for enabling or facilitating technology-based activities as a prerequisite for regional development especially in backward, lagging regions. The peak of this type of approach to the role of information in regional development may be epitomized by the formulation of the "innovation-oriented regional policy" and related proposals.

In contrast to this concept of indirect effects of information - through innovation in production techniques - on regional development the second approach visualises a more direct impact of new communication technologies on locational requirements of production and on mobility patterns. At the same time, fears and anxieties concerning the negative impact of these technologies come to the fore. The ease with which the "friction of distance" may be overcome with the help of these technologies, are held to constitute dangers for jobs and for the traditional role of cities, without leading by itself to a diminishing of the differences in the development levels between core and peripheral areas. No shift of activities from core to periphery is

expected, only a large scale shift from some large metropolitan areas to other centers is held to be probable.

Concerning the first approach it must be noted that the fact that peripheral regions are indeed handicapped with respect to the presence of technologically advanced, innovation-oriented activities and that, to a large extent, this is due to the absence or difficult access to innovation-relevant information, is well evidenced in numerous reports (for a comprehensive review concerning the Anglo-Saxon world see Malecki, 1983).

Thwaites, in his study on regional variations in product innovation in Great Britain, concludes that the organizational structure of enterprises prevailing in a given area, the degree of external control, the qualifications and availability of personnel as well as the access to innovation-relevant information together determine the innovative potential of a region and the opportunities of survival of its industries. (Thwaites, 1982).

An interesting aspect of the knowledge gained by Thwaites in his studies was that the executives in the South East have not thought information was an important factor of innovative performance of their firms. This corresponds to the results of the analysis of location factors in the German economy (Bundesforschungsanstalt, 1982) where the questioned managers put a much higher rank on the availability of personnel, and of industrial land, and the possibility of using existing buildings in a ranking of location choice factors than on the presence of similar businesses, contact and access possibilities and the like. One possible explanation of these results may be the fact that in the core regions information and contacts are readily available, and thus cease to form a relevant part of the economic environment in the perception of managers of enterprises.

In the German context three groups of studies may be considered to belong to the innovation-information point of view on regional policy:

- (1) Studies of the effects of large corporations on regional economic structure,

- (2) Propositions concerning innovation-oriented regional policies, and
- (3) Studies on and proposals for decentralization of public employment.

Let us consider these various aspects:

- (1) The first group of studies is connected mainly with the name of Bade (1979, 1980, 1981, 1984), and draws conceptually on the Swedish and English research on the spatial structure of organizations. Bade's main objective was to inquire whether the large multi-plant corporations which, on the average, grow much faster than the rest of the firms in the Federal Republic of Germany and concentrate strongly through mergers, and thus occupy a large share of production, sales and jobopportunities in the economy, exert detrimental effects on the economic structure of the peripheral, lagging regions.

If they do, it is mainly be spatial division of functional control and production, which in turn is supposed to result in a far greater sensibility of employment in the lagging regions to the economic cycle and also in a deterioration of the innovation-adoption potential, of the innovative climate and generally in bad "psychological industrial relations" in these areas.

In more recent studies (Bade 1981, 1984) the results show that although in the large agglomerations not only administrative but also productive functions are concentrated, the disparity between rural lagging regions and the core regions can be observed in the regional-functional specialization. This means that the lagging regions are generally devoid of certain activities, and that, should some enterprise decide to locate workplaces there, they will most probably be in the routine, low level category.

- (2) The proposals for innovation-oriented regional policies (Ewers et al., 1978, 1980) also draw conceptually on the writings of Tornqvist and other Swedish scholars. The main idea put forward is that the traditional regional policy

measures such as tax-reduction, low interest loans, subsidies etc. aimed at supporting the functioning of firms in lagging regions tend to create an artificial economic environment, and artificial market conditions. If for these firms it is difficult to survive without support, but possible to function with subsidy, an adjustment of the firms to the artificial conditions will follow. They then tend to remain less competitive than firms in other areas which do not obtain support.

The authors argue for a policy aimed at increasing competitiveness of the medium and small firms which dominate the economy of the lagging regions. One way to achieve this goal is to increase the share of products which are new, which are a result of innovation. The major obstacle for innovative activities is the lack of highly specialized technological and other information and qualified personnel in peripherally located firms.

- (3) The final group of studies deals with problems of location and re-location of public authorities of various (Ganser et al., 1979, Funk, Blum, 1984). The awareness that employment in the public sector has large regional development potential is not new. Already in 1968, during a meeting of ministers of German states responsible for space economy and regional planning, the opinion was formulated that:

"Vor allem ist die Tätigkeit der Verwaltungsdienststellen, je nach ihrem Aufgabenbereich und je nach räumlicher Ausdehnung ihrer Zuständigkeit, ein wichtiger Beitrag zur Versorgung der Bevölkerung und der Wirtschaft eines großen Bereiches mit Dienstleistungen. Von Bedeutung kann auch das Angebot an Arbeitsplätzen, ebenso der von ihnen ausgehende Einkommenseffekt sein. Das gilt insbesondere für zurückgebliebene Gebiete, Bundesausbaugebiete und das Zonenrandgebiet" (Bundestagsdrucksache V. 3958, p. 152). This opinion has also been repeated in the Federal Government Reports on Regional Planning (Raumordnungsberichte) in 1974 and 1978.

Table 1: Newly established and relocated plants, Federal Republic of Germany, 1964-1981.

Year	Number of plants	Total employment
1964	867	52 230
1965	833	43 460
1966	716	37 480
1967	518	23 310
1968	673	38 700
1969	877	51 500
1970	683	43 240
1971	645	32 820
1972	462	24 300
1973	377	22 280
1974	225	14 080
1975	228	11 960
1976	209	9 890
1977	190	8 570
1978	241	11 579
1979	168	9 492
1980	216	11 773
1981	165	13 279

See: Kowalski, 1983a.

The rationale behind emphasizing the location of public sector employment focused on the following points. Workplaces in the public sector are mainly permanent, not dependent on the short or even long term economic tendencies. They, therefore, provide a peripheral lagging region with a stable core of employment which will survive bad times exerting primary and secondary income effects. Apart from this argument, possible changes in the regional employment level and structure could hardly result from the founding of new industrial establishments. While the mobility of industrial plants, counting relocations as well as the enlargement of already existing facilities, will become increasingly negligible (see Table 1).

This in turn leads to the conclusion that the spatial structure of industrial employment will, to a large extent, remain stable until the end of the century or beyond, with only small adjustments occurring in a limited number of places. Thus, the major goal of regional policies, the provision of workplaces and an improvement of the quality of life in peripheral regions, can be realized almost exclusively by means of a re-location of employment in services, specifically in services provided by the public sector.

Until now no comprehensive programme of a relocation of public employees to the peripheral regions has been undertaken, at least not comparable to the efforts which have been pursued - and already have sometimes failed - in Sweden, Holland and England.

2. SPATIAL IMPACTS OF INFORMATION TECHNOLOGY: SOME HYPOTHESES

The possible spatial and employment impacts of the introduction of the new information technologies came to the attention of spatial planners in the Federal Republic of Germany only very recently. In a forecast of the future spatial organization of the country prepared by PROGNOSE and Bundesforschungsanstalt für Landeskunde und Raumordnung in 1983 several scenarios of future employment patterns include different assumptions concerning the growth of productivity of labour, but no spatial consequences of new communication technologies are discussed.

Referring to long term effects of these technologies on employment as a whole, no consensus is achieved in the literature. Some studies maintain that the overall impact will be neutral or negligible, since disappearance of workplaces will be compensated by the creation of others (see Dostal, 1982). Other authors are more pessimistic in predicting considerable loss in the employment level (e.g. Henckel et al., 1984), still other reports recognize that the results of forecasts are extremely sensitive to the underlying assumptions, so that very little in the way of hard facts can be achieved (OECD, 1981). Generally, the overall effects of new technologies on society and its functioning can be estimated only in a value-loaded way (see OECD, 1983).

It seems obvious that the advent of new communication technologies will lead at least to serious structural changes in the labour market. Many routine jobs will vanish and certainly others will be created. But in respect to the possible overall decrease of the number of workplaces some fears seem exaggerated, at least in a long term perspective, considering the present demographic tendencies in industrialized societies.

As mentioned above, new technologies also influence locational behaviour. Generally they increase the degree of freedom of locational choice of firms and individual households. At the same time they may widen the attractiveness gap between core and periphery, should the latter for some reason remain outside the umbrella of new information networks. Also, regarding some types of service activities (banking, insurance etc.), new information technologies through permitting largely increased scales of firms, and as a result of an increase in the degree of complexity of operation may lead to a stronger reliance on locations within the large agglomerations.

In a recent study of the spatial effects of new communication technologies on urban and regional development a team of German authors (Henckel et al., 1984) investigated these issues in a rather speculative manner. They conducted questionnaire analyses and interviews with experts in information technology-dependent

enterprises. As the authors state, their conclusions must be treated with caution due to the incomplete data and the "non-scientific" methodology. They may be summarized as follows (op. cit., p. 161-162):

- (1) Economic factors and increased acceptance levels will lead to a relatively fast diffusion of new information technologies.
- (2) Information technology does not in itself cause spatial changes. However, it reinforces existing migratory trends.
- (3) Information technology is a necessary but not a sufficient condition for the acceleration of spatial deconcentration.
- (4) Spatial effects of information technology are not uni-directional. Both centripetal and centrifugal effects are discernible.
- (5) No equilization of development levels between agglomerated areas and the countryside should be expected. In the foreseeable future the spatial effects of new communication technologies will be the strengthening of the advantages of metropolitan areas and local centers as compared to the periphery.
- (6) The North-South shift of population and economic activities will be reinforced.

With respect to the impact of new communication technologies on traffic flows various tendencies have to be regarded: A slight decrease of flows as a consequence of tele-work; a decrease of flows of commuter traffic as a result of the local decentralization tendencies; a decrease of flows as a result of consumer use of information technologies (tele-banking, tele-shopping etc.); increased flows in consequence of increasing leisure time activities.

The conclusion can be stated that the recognition of possible spatial effects of the adoption of new information technologies is a necessary supplement to the proposals concerning information-based innovation-oriented regional policies.

It must be considered that the explosive spread of these technologies, while in principle making it easier to provide information facilities and to enable the processing and transfer of information in practically every location in peripheral areas, will also lead to tensions concerning the viability of the centers of large cities and increase the relative backwardness of the periphery.

A real danger exists that the spread of new information technologies will be directed predominantly to already developed areas whereas the peripheral regions will stay largely devoid of information transfer networks (see Hoberg, 1983, Schulz-Trieglaff, 1982).

Thus, the introduction of new communication media does not diminish the relevance of regional policies measures including the provision of innovation-relevant information. On the contrary, the growing importance of information technologies in the reshaping of the society will enhance the potential role of regional policy in the future.

3. INFORMATION DEVELOPMENT POLES IN THE FEDERAL REPUBLIC OF GERMANY: AN ATTEMPT ON IDENTIFICATION

If, as explained in the previous chapters, easy access to information and intensive participation in communication on technological development and innovation is to be considered a constitutive element of urban and regional economic development potentials, consequently, some quantitative indicators of information flows and communication participation of an area should be reflected in determining that area's development status.

In a number of studies conducted in the Institute for Economic Policy and Economic Research at the University of Karlsruhe (see Funk et al., 1980), efforts were made to provide an operational concept of classifying regions as to their development pole (Perroux, 1955) characteristics. More recently, the elements considered in these studies were extended to include

information variables (see Kowalski, 1983a). In this preliminary study, it was postulated that those cities which are hosts to an above-average concentration of information-intensive activities are potentially relevant for future regional economic development, and that an absence of cities of this kind may be causal for the lagging of regions, and may have been responsible for discouraging results of regional policies in the past.

The availability of data reflecting the importance of cities as information poles has posed problems, the most serious limitation being the lack of data showing information linkages between cities. Hence, instead of being able to analyse the inter-spatial pattern of information exchange a survey of indicators of the spatial presence of information-rich activities was carried out for separate cities.

91 so-called kreisfreie Städte (county status cities) have been included in the study, data for the following variables and years have been compiled:

- 1) Number of telex lines (1980),
- 2) Presence or non-presence of a Chamber of Industry and Commerce (1980),
- 3) Number of persons employed in the civil service (1978),
- 4) Number of telephone calls (1980),
- 5) Number of scientific and teaching staff at institutes of higher learning (1979),
- 6) Number of headquarters of large industrial enterprises (1980),
- 7) Number of scientific associations and societies (1978),
- 8) Number of scientific institutes outside universities (1979),
- 9) Number of outside visitors who spent at least one night in a given city (1970, 1979),
- 10) Number of beds in hotels and pensions (1970, 1979),
- 11) Number of post-offices of higher level (1980),
- 12) Number of persons employed in federal institutions (1972).

The selection of variables has been influenced by the availability of data. Some data act as proxy variables for information flows, e.g. the number of post-offices, taken to represent

the letter and telegram exchange. It should be pointed out that the data partly refer to the communication infrastructure and partly reflect the actual intensity of information exchange. Together they are presumed to devise a certain information profile of a city.

Computations have followed two methods. First, a simple ranking of cities according to three variables was established for 1970 and 1979; then the scores were added and aggregate ranks of cities produced. The three variables that were used because they were the only ones for which complete data for 1970 and 1979 could be obtained were: number of hotel beds, number of overnight stays and employment in federal institutions. Second, an assignment of cities into classes of information hierarchy was achieved, using the vector dominance technique (Blum 1982). In this method the levels of all variables for all cities are compared. If a given city is characterised by higher values for all variables, as compared with another city, it is said to dominate this other city and assigned to a higher class. If only some values are higher, but values for other variables are lower, then the two cities are assigned to the same class in the hierarchy.

Table 2 shows the cities which leaped upward or fell downward more than five positions in the ranking between 1970 and 1979. Two plus-signs means a leap of extraordinary proportions (more than the positions). Also shown is whether a city has its geographical site within a Regional Support Area (Fördergebiet) or within the Borderlandzone (Zonenrandgebiet).

The results do not show a clear spatial pattern: Among the improving and the declining cities, one finds cities inside the Regional Support Area and the Borderlandzone. One fact however, is indisputable: the large cities are found in the gaining group, and in contrast, the group of declining cities consists only of small and middle size cities, including such well-known peripheral problem cities as Flensburg, Pirmasens, and Kempten. Surprisingly good performance is recorded for several large industrial cities located in the overcongested area of Northrhine-Westphalia, held to be suffering from too high a share of the

traditional heavy industries: Essen, Gelsenkirchen, Mönchengladbach, Solingen, and Leverkusen. On the whole, no reduction of disparity in the informational status of cities in problem areas as against those in higher developed areas is observed.

Some results of the hierarchy-building are shown in Table 3. The set of cities has been divided into three sub-sets of 30 to 31 cities each, according to the city sizes - small cities from 30 to 100 thousand inhabitants, the middle size cities from more than 100 to 200 thousand inhabitants, and large cities of more than 200 thousand inhabitants.

This sub-set formation was done in order to obtain a finer assignment of cities to classes, since it is obvious that the information relevance of a city is to a large extent a function of the city size. Small cities, therefore, would have almost no chance to be assigned to one of the higher classes if included in one set with the large ones. It is, however, important from the regional policy point of view to learn which of the small or middle size cities dominate other cities of corresponding size as centers of information production and exchange.

Hamburg, Munich, Cologne, Frankfurt, and Düsseldorf are at the top of the overall city-hierarchy, a fact which confirms the intuitive knowledge about the Federal Republic of Germany. In some of the hierarchical structures using three variables for 1979 and 1970, Frankfurt dominates all other cities, although it is much smaller than Hamburg and Munich. Some of the large cities, like Gelsenkirchen, Mönchengladbach, Solingen, are way down in the hierarchy (class 4 in the allvariable hierarchy), but at the same time they belong to those cities which in the ranking, leaped upward. Other large cities in the lower classes of the three-variable hierarchy, which did not improve their hierarchy position, are generally located in the Ruhr industrial region. The rest of the lower classes cities are of small and medium size: university cities like Heidelberg, or Freiburg, and administrative centers like Bonn are, as is to be expected, highly placed in the hierarchy, relative to their population size.

Table 2: Changes in city hierarchy, 1970-1979 Cities which experienced jump in their rank of more than 5 positions

Upward leap	Downward fall
of more than five positions	
Ansbach ¹⁾	Memmingen
Frankenthal ¹⁾	Welden ¹¹⁾
Straubing ¹⁾	Baden-Baden
Schweinfurt ¹⁾	Neustadt a.d. Weinstr.
Erlangen ⁾	Emden ¹⁾
Fürth	Kempten ¹⁾
Wilhelmshaven ¹⁾	Pirmasens ¹⁾
Salzgitter ¹¹⁾	Landshut ¹⁾
Wolfsburg ¹¹⁾	Aschaffenburg
Leverkusen ⁾	Bayreuth ¹¹⁾
Mainz	Flensburg ¹¹⁾
Ludwigshafen	Heilbronn
Solingen	Koblenz
Mülheim	Hagen
Münster, Mönchengladbach	
Bielefeld	
Gelsenkirchen ⁾	
Essen ⁾	

1) City within regional support area.

11) City within borderlandzone.

) Upward leap of more than 10 positions.

See: Kowalski, 1983a.

Table 3a: City hierarchy, Federal Republic of Germany *)

Class	Big cities	
	1979	1970
1	München Hamburg	Hamburg München
2	Frankfurt (Main) Köln	Frankfurt (Main)
3	Hannover Düsseldorf Stuttgart	Bonn Köln
4	Bonn Nürnberg	Hannover Stuttgart Düsseldorf
5	Lübeck Saarbrücken Wiesbaden Bremen	Lübeck Nürnberg
6	Karlsruhe Essen Dortmund	Wiesbaden Saarbrücken Bremen Duisburg Essen
	all others	

*) Using three variables (see text, chapter 3).

Table 3b: City hierarchy, Federal Republic of Germany *)

Class	Medium size cities	
	1979	1970
1	Koblenz Würzburg Heidelberg Mainz Kassel	Koblenz Kassel Heidelberg
2	Ulm Trier Regensburg Darmstadt Freiburg i. Br.	Trier Würzburg Darmstadt Wilhelmshaven Regensburg Freiburg i. Br.
3	Osnabrück Ludwigshafen a.Rh.	Ulm Mainz
4	Wilhelmshaven Oldenburg Bremerhaven	Osnabrück
5	Kaiserslautern Heilbronn Leverkusen	Flensburg Oldenburg Heilbronn Bremerhaven
	all others	

*) Using three variables (see text, chapter 3).

Table 3c: City hierarchy, Federal Republic of Germany *)

Class	Small cities	
	1979	1970
1	Passau Baden-Baden Ingolstadt Erlangen	Passau Bayreuth Baden-Baden Bamberg
2	Rosenheim Bayreuth Bamberg	Rosenheim Emden Pirmasens Aschaffenburg Neustadt a.d.Wstr. Kempten Landshut Ingolstadt
3	Ansbach Neustadt a.d.Wstr. Kempten Landshut Aschaffenburg	Weiden i.d.Opf. Hof Erlangen Coburg Schweinfurt
	all others	

*) Using three variables (see text, chapter 3).

See: Kowalski, 1983a.

In the case of the thirty smallest cities, two main influences can be traced: that of city size, and of location in Bavaria. The cities at the top of the hierarchy, in 1979 and in 1970, like Ingolstadt and Erlangen, are the largest of the thirty. Baden-Baden, also not unexpectedly, is in the top class in both years, as a recognized place of many international meetings, conferences and exhibits. Passau raised to the top in recent years because of the founding of a new university. Other cities in Bavaria, like Bamberg and Bayreuth, have also performed well, obviously because of their university locations.

Furthermore, the hierarchy-situation is especially difficult in the lagging regions within the states of Rhineland-Palatinate and Schleswig-Holstein. The regional centers in these states, as a rule, are very low in the information hierarchy. In Bavaria the picture is mixed, with some cities leading the hierarchy, and large areas in the Borderlandzone being devoid of information centers. Lower Saxony is also not a clearcut case: here cities in lagging areas take middle positions.

Some evidence to the hypothesis that the information status influences the economic performance of a city in a lagging region is presented in Table 4. It shows those cities which are at the top and at the bottom of the information hierarchies (for the sub-set of small cities), and gives their growth proportionality factor (GPF). The GPF (see Blum, 1982) is an indicator comparing over a given period of time the actual increase of production in a city to its growth potential as determined by the investment in the infrastructure during the same period and the factor productivities. A GPF greater than 1 means that a given city has obtained more than its potential production, meaning that its economy has performed well. In turn, a GPF smaller than 1 means that the achieved production is smaller than the potential one. The reasons for the GPFs being smaller or greater than 1 can be numerous. The data in Table 4 give reason to the supposition that a lack or an abundance of information could have been responsible for low or high performance of a city's economy.

Table 4: Growth proportionality factors and gross value added per capita in selected cities in the Federal Republic of Germany, 1978

Top level cities in the hierarchy of small cities	GPF	Gross value added per capita 1,000 DM
Rosenheim	0,961	24,42
Baden-Baden	1,102	28,82
Aschaffenburg	0,932	29,97
Bamberg	0,679	27,57
Pirmasens	0,910	19,29
Bayreuth	1,131	41,05
Ingolstadt	0,884	28,20
Erlangen	1,629	38,25
Lowest level cities in the hierarchy of small cities		
Schwabach	0,853	13,88
Zweibrücken	0,787	21,82
Landau / Pfalz	0,738	17,77
Memmingen	0,914	31,89
Frankenthal	0,726	20,84
Speyer	0,951	27,91
Kaufbeuren	0,925	17,14
Amberg	1,233	22,64
Delmenhorst	1,008	15,63

See: Kowalski, 1983a.

Adding up it may be said that no significant gains for smaller cities in peripheral regions can be seen with the exception of the three above mentioned cities in Bavaria. With due caution it is possible to state that in the spatial organization of the Federal Republic of Germany, as seen from the perspective of information flows and exchange, a core periphery relationship can be detected with strong dependency aspects. The dependency of the periphery from the core results from the fact that most headquarters of large economic organizations are located in the largest cities, i.e. in the core. This means that, in many cases, activities in peripheral areas are externally controlled from the largest cities. The weak position of the periphery in the information landscape of the country reinforces the dependency relationship, rendering ineffective those efforts that attempt to make the economic structure in the periphery more viable. In the Federal Republic of Germany the core is formed by the largest cities (Hamburg, Munich, Cologne, Frankfurt, Düsseldorf) and the flows between them. The periphery in turn coincides with the areas close to the eastern border to the GDR and CSSR as well as the areas west of the river Rhine in the Palatinate and in the northern parts of the country, close to Denmark.

The periphery to a large extent corresponds to the Regional Support Areas. The discrepancy in information status between core and periphery has not diminished during the last decade. Rather, as the data show, the opposite seems to have been the case. This in part may explain why, although regional policies led to a diminished contrast between core and periphery with respect to transport infrastructure, public facilities, energy supply and so forth, these developments failed to generate a private investment and a growth of production and trade in the periphery (see Bade, 1982, Zimmermann, 1982) sufficient to markedly improve their position.

4. CONCLUSION

The policy claim of this paper is that a neglect of information diffusion aspects may seriously endanger the possible success of

regional and development policies. As a possible course of action the following measures seem to be promising with respect to peripheral areas:

- (1) Elaboration and extension of the services of innovation-advisory units.
- (2) Support of growth of institutions of higher learning located in non-center areas.
- (3) Re-location from core to periphery of adequate units of public administration.

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DISCUSSIONS

Paper by S. Dresch

Discussion participants: R. Bolton, P. Joynt, A. Straszak,
U. Loeser, L. Kajriukstis, S. Dresch.

Levely discussion centered around two issues:

How are regional problems and decisions delimited and formulated - are they substantially based or "merely" political?, and: What is the link between science, education system etc. and technological and economic change?

With regard to the first question instances were quoted where regional problems arise in a natural way out of geographical and economic circumstances, waiting only for proper solutions, engaging also political structures. The cases quoted referred to riversheds and to geographico-economic East-West situation in South America, where large areas along the Western coast have much greater development capacity than is presently released, due to economic, but also political conditions.

As to the second question it was stated that the relations in question are of the necessary, but not sufficient condition-type, so that simple reasoning can fail both ways. The situation is further made even more vague by the lack of clear definitions in the domain.

Paper by A. Mouwen and P. Nijkamp

Discussion participants: A. Straszak, R. Kulikowski, L. Lacko,
S. Ikeda, A. Kochetkov, A. Mouwen.

This discussion, which to a large extent continued the themes of the paper itself and of discussion to the previous paper, focussed mainly on conditions and mechanisms of knowledge and technology transfer from science to production practice. Within this context social and spatial mobility of scientists, research centers and knowledge-intensive firms was assessed. Instances were quoted of large, scientifically self-sufficient firms moving out of bigger urban centers, with the small ones

moving in, for instance, to get closer to the research resources. On the other hand the example of Tsukuba was shown to indicate the real possibility of speeding up the regional development around a large scientific compound - by attracting businesses which could profit from cooperation. This development occurred over 15 years, and there is another one, chip-oriented, underway in Japan in the Kyushu region. Thus, while it was deemed important to secure the link between science and actual promotion, other conditions may play an important role, e.g. communication infrastructure or competitiveness. Experience from one place may not be fully transferable to another, and hence differences between the Dutch and the Swedish case. Knowledge-based development requires special orientation of investments - it was said that in the case of the Netherlands approx. 4% of GNP would be devoted R and D.

Paper by K. Polenske and Wm. Crown

Discussion participants: G. Bianchi, P. Joynt, K. Polenske.

The main question raised concerned the way in which the inter-regional coefficients can be obtained, since this was deemed to be far more difficult than for the technical coefficients. The procedure taken in the work presented started with trade tables, on which a balancing is performed. Then goals transportation data come in. Both these steps, however, do in fact still leave out some cells in the matrix. Hence, an expert-based range estimation is applied and final row and column balancing is performed. The whole procedure is implemented with two main computer programs MATHER and PASSION.

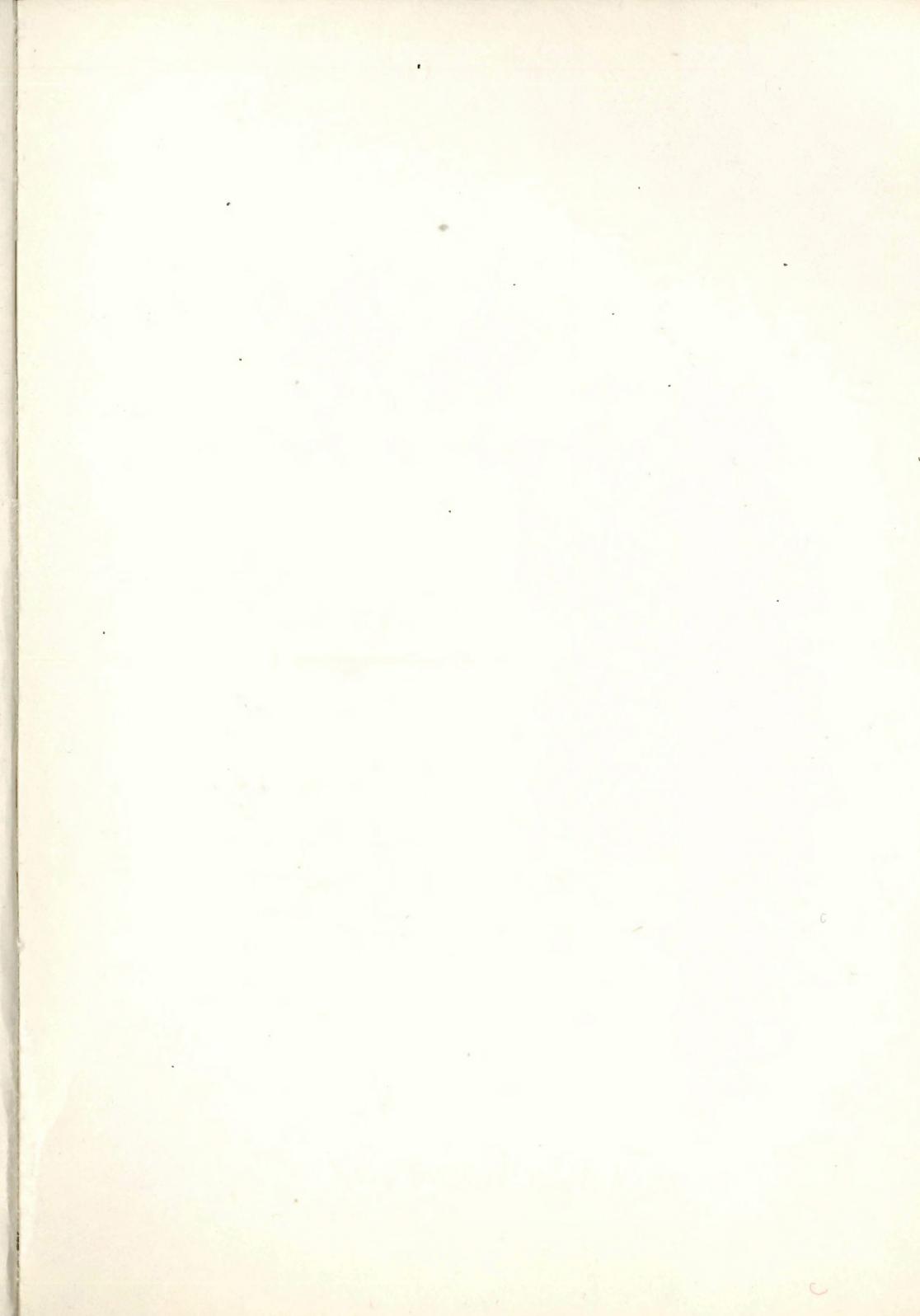
Paper by T. Vasko

Discussion participants: M. Steiner, A. Straszak, J. Owsinski,
T. Vasko.

First, a clarification was asked for as to the meaning of information space. The answer consisted in statement that a general innovation is composed of simple innovations such as market innovation, product improvement etc., and that any simple innovation can hardly have an economic effect. Thus, innovations appear as compounds in the simple innovation space.

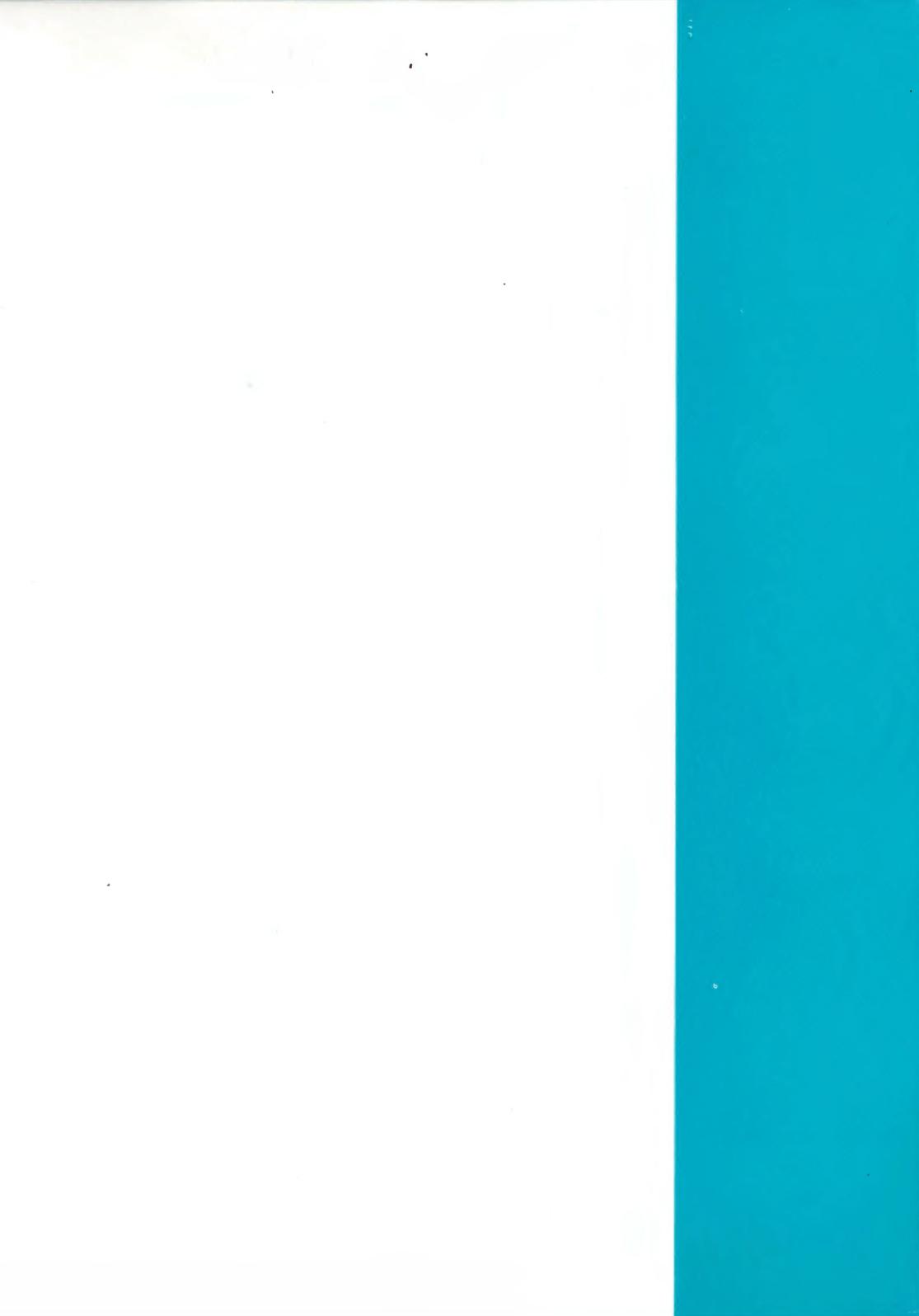
Then, a portion of discussion was devoted to identification of the logistic curves involved. Besides the very identification question, where the starting time-point was deemed of special importance, the problem of interplay of product values: exchange value, use value and production cost, was emphasized. Answering another question the speaker said that by looking at the innovations side he gets the idea that the new general economic upswing has had began by then, but that other analysts, e.g. C. Marchetti, see it coming in only about a decade.

Paper by R. Funck and J. Kowalski was not discussed since it was presented after the workshop.



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ADDRESS

6, NEWELSKA ST.

01-447 WARSAW

Tel. 36-44-14 , 36-81-50

Telex: 812397 ibs pl