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INDUSTRIAL SPECIALISATION IN VERY SPARSELY POPULATED REGIONS

Abstract The importance of localised capabilities is argued to increase when most inputs are available world-wide because of globalisation and abolition of barriers to trade. As a consequence of this process of ubiquitousness, industry and region specific knowledge becomes more important. In addition to experience in similar activities, knowledge flows and technological spillovers require interaction and regular face-to-face contacts, and, thus, spatial proximity. Hence, specialisation is considered to enhance competitiveness not only at firm level but also at the regional level. Specialisation has been put forward as a new form of regional competitive strategy in numerous theoretical approaches in regional development. However, as a competitive strategy regional specialisation poses new challenges especially for small and peripheral regions. According to recent theories, instead of traditional issues such as long distances from centres and markets, the major problem facing peripheral and sparsely populated regions can be seen as whether these regions can offer favourable conditions for successful industries. This question is also of major concern in regional policy.

Finland and the other Nordic countries are sparsely populated and characterised by scattered settlement structures. This paper focuses on industrial specialisation from the 1970s to the 1990s in the case of Finnish regions. The main purpose is to determine 1) whether specialisation can be considered a relevant strategy in the case of Finnish regions, and, 2) how these regions have coped with the need for industrial specialisation. These issues are investigated on the basis of detailed data on manufacturing industries covering sectoral and regional employment figures in Finnish labour market districts. Most of these regions are small, rural municipalities characterised by low population densities and small centres. In a considerable number of regions industrial employment consists of less than 100 employees. The development is analysed by dividing regions into different size and type categories. The empirical observations of the present study support the view that the specialisation dynamics of growing and stagnating regions has to be analysed separately.

1. Introduction

In an era of increasing globalisation and deepening integration, considerable changes confronting firms require their adjusting to more open and larger international markets. Particularly firms operating in high-cost countries have been compelled to combine traditional competitive factors in a unique way and to create new strategies to maintain their competitiveness. Intensification of competition has also increased the roles of regional strengths and localised capabilities, which refer especially to industry and region specific knowledge and skills. Thus, changes concerning competitive position and operational environment tend to reinforce the industrial specialisation of local and regional economies which are seeking their role in the global economy. Increasing regional concentration of similar and related industries and the accompanying industrial specialisation of regional economies lead to an intertwined process. Consequently, the development of industries and regions will be tightly connected. Localised capabilities and successful industries are also considered to occupy a key position in regional policy.

Overall, regional specialisation has been viewed as an essential growth factor, which has been surveyed mostly by means of case studies. However, observations concerning the characteristics of individual successful cases cannot necessarily be broadly generalised. In addition to the obvious fact that each case has its specific and unique characteristics, the concepts put forward, such as cooperation, interactive learning and network-based innovation systems require regular face-to-face contacts and, thus, the spatial proximity of the actors involved. The latter issue is of special importance in the case of sparsely populated countries, such as Finland (15 inhabitants per sq. km), where the prevailing spatial structure may form a structural obstacle to the increasing importance of regional specialisation and thereby maintaining and promoting competitiveness. Although individual manufacturing industries have been important to local economies in Finland, regional specialisation in most cases reflects the small size of the region, or the significance of internal economies of scale and location decisions of plants in process industries, rather than external economies associated with regional specialisation. It has been observed that this kind of specialisation seldom transforms into regional growth.

In this study the changes in the trends of regional specialisation are analysed on the basis of extensive statistical data in the case of Finland. These observations concern development from the 1970s to the 1990s - a period characterised by such features as internationalisation of firms, many-sided impacts of globalisation, systematic abolition of barriers to trade and deepening integration as well as the changes in regional and industrial policy doctrines. Theoretical approaches and some general aspects of specialisation are briefly discussed in Section 2. The typical characteristics of the Nordic countries and

their influence on the dynamics of specialisation are considered in Section 3. Section 4 includes the empirical observations, and conclusions are presented in Section 5.

2. Regional specialisation and changing competitive situation

2.1 Research tradition

Regional concentration of related industries, i.e. localisation, is not, as such, a new phenomenon. Specialised regional industry clusters have been more the rule than an exception (see e.g. Krugman 1991, DeBresson & Amesse 1991). Localisation concerns both consumer and production goods and in addition to manufacturing several service sectors as well. Examples of traditional regional industry clusters include, for example, Sheffield's steel industry, the motor industry in Detroit and in the Finnish case the furniture industry in the Lahti region. During the last two decades the electronics industry in Silicon Valley has been cited as a model example of a modern industrial cluster. As a consequence, there have been numerous attempts to imitate and copy the success of Silicon Valley in the form of various science parks and technology villages all around the world. Notwithstanding the recent attention given the high-tech industries, the successful examples are not limited to technology intensive sectors. Since the late 1970s specialised manufacturing regions have gained notice in most Western European countries, particularly in the northwestern part of Italy known as Third Italy (see e.g. Goodman *et al.* 1989). According to these and numerous other examples, the increasing concentration of individual manufacturing industries is not contradictory to the change in the locational pattern of the manufacturing industry, which has taken place after the Second World War and especially since the 1960s, and has been observed in various contexts (e.g. Norton & Rees 1979, Keeble & Tyler 1995): the dispersion of the whole manufacturing sector from the traditional industrial and metropolitan areas. However, the branch plant phase and specialised growth should not be interpreted as simultaneous phases.

There is also a long tradition in scientific research which analyses the causes of regional specialisation. According to Marshall (1890) efficient industry clusters consist of local production chains formed by independent small firms utilising skilled labour. These clusters are characterised by a strong industrial atmosphere tying together people and firms, and externalities, which result from specialised skilled labour, better accessibility of subsidiary trades and technological spillovers. After Marshall such representatives of the neoclassical school as Weber, Lösch, Greenhut and Isard developed location theories analysing the optimal location of individual firms at a certain point in time. In these static

approaches the factors behind localisation were classified as transportation and transaction costs and economies of scale resulting from flexibility and efficiency. Since the late 1970s mainstream economists have paid more attention to regional specialisation and localisation because of the new lines of thought and methods available. Localisation and specialisation can be seen as yet another manifestation of economies of scale, which are crucial elements in the new theories of international trade and endogenous growth. The possibility of treating economies of scale, uncertainty and imperfect competition analytically enables the formal analysis of localisation through complex mathematical models. The most famous examples of this trend are Paul Krugman's numerous articles dealing with the phenomenon. His writings have contributed to improving the status of the geography of economic phenomena in recent years.

The increasing importance of small firm-based regional production systems is also linked with the ongoing changes concerning organisation structures and production systems. According to several authors the previously dominant system based on Fordist mass production has drifted into crisis because of increasing internationalisation and globalisation. Increasing competition, technological development and changes in consumption habits have significantly shortened the life cycle of individual products, thus raising the importance of flexibility, technological know-how and innovativeness. Expanding markets increase uncertainties and risks faced by firms, and organisational innovations are introduced to divide operations into smaller entities. Together with the abolition of barriers to international trade this process opens global markets to flexible and specialised SMEs in several industries.

The growing importance of innovativeness, and thus knowledge, is highlighted in recent theoretical approaches. Static competition based on cost minimisation has been replaced by dynamic competition based on the accumulation of knowledge, which leads to continuous changes and then to a need to acquire competitiveness through utilising these changes. Dynamic competition is accelerated by rapid imitation and copying of successful product innovations, which reduces the advantage gained over competitors and in turn increases the importance of research and development investments. This process is further accelerated by the development of information technology and means of communication. Knowledge becomes more important both in actual production processes because of new production methods such as CAD and CAM, which have also become common in many SMEs, as well as when information intensive services supporting production become more important.

2.2 Recent focus on a broader context

Recent theories - partly from outside mainstream economics - dealing with localisation and

specialisation form a rich and diversified field of economic thought which has been typologised, for instance, by Pratt (1991), Malmberg *et al.* (1996) and Hassink (1997). Although there are some clear-cut differences between these approaches, most of them share the common feature of emphasising factors other than the purely economic. In addition to innovativeness and knowledge, the significance of a favourable operational environment, cooperation and networks is highlighted. Special attention is paid to the role of cultural, social and institutional factors as the prerequisites for providing a favourable seedbed for successful industries. More weight is also placed on the endogenous nature of the growth process. The question of what is produced is regarded as less crucial compared to how to create and develop favourable conditions promoting local entrepreneurship, and, thus, local growth. Analysis has also shifted from the level of individual firms to the level of industries and regions, which means taking into account the larger context, including the economic and operational environment surrounding the firms. In practise these levels are not distinct. Therefore, the concept of network has been introduced to combine them.

Networking promotes the interactive and collective learning process required by technical development and speeds up the formation of common norms and standards. When competitive firms all over the world have better possibilities to benefit from the same technical improvements, and the same competitive factors can be more rapidly utilised everywhere because of globalisation and technical improvements¹, it becomes crucial to shift from traditional efficiency-based price competition and stress the importance of quality, flexibility, innovativeness, product differentiation and specialisation to enhance competitiveness. A change in competitive strategy can be promoted by cooperation and networking. Obtaining new and valuable information presupposes good and functioning relations with other firms since this kind of information is usually tacit and non-codifiable in nature. Thus, creating contacts becomes essential for improving and even maintaining competitiveness. Although networks can be global, interactive cooperation is often based on personal contacts and implicit contracts. Mutual trust presupposes proximity and a common culture; as a consequence local and regional networks are significant and valuable especially in the first phases of the innovation process (Debresson & Amesse 1991).

In addition to the voluntary diffusion of information taking place through the cooperation of economic actors, regional specialisation is characterised by technological spillovers, which are considered to be highly relevant especially in those industries where R & D investments play an important role. Although the results concerning the efficiency of programmes targeted towards high tech industries are quite mixed (see e.g. Nelson 1992), governments in many countries have started to pay more attention to these sectors to secure stable economic growth. However, spillovers are also important in

other sectors. For instance, regions in Third Italy are typically specialised in traditional manufacturing industries characterised by design products and a continuous flow of innovations. Such regional specialisation offers possibilities of success in traditional industries also for those countries which do not have the resources to extensively utilise high tech sectors or the possibilities for massive investments in industries such as aircraft, electronics or armaments. In the Nordic case, the flourishing telecommunication sectors of Finland and Sweden can be seen as exceptions to the rule; the prosperity of both these countries has been based on narrow segments of specific applications, i.e. niche products, which usually represent low or middle levels of technology (Maskell *et al.* 1998).

3. Regional specialisation in sparsely populated regions

3.1 Spatial structure as an obstacle to new regional growth

Both flexible specialisation and diffusion of knowledge, not to mention competitive advantage gained through utilising localised capabilities embedded in the region and the importance of different institutional actors, presuppose close connections between economic and social actors. Hence, the regional development characterised above is essentially linked with the dynamics of functional regions. These functional entities typically consist of towns and their surrounding areas. However, in the case of such sparsely populated countries as Finland - and other Nordic countries such as Sweden and Norway as well - a considerable share of the functional or daily regions are in "no town's land". Despite the concentration of population and manufacturing in the southern parts of Finland, the share of urban population is lower than in other EU countries. Consequently, many of the functional regions are too small to accommodate a specialised industry with several firms. In addition, they are geographically scattered in a way that does not permit their being linked to larger functional regions.

Whether the recent theories dealing with regional specialisation are called institutional, structuralist or neo-Schumpeterian, traditional competitive strategies such as close proximity to markets and accessibility are replaced by ideas such as whether regions can offer a favourable economic environment to competitive industries. Thus, creating a competitive advantage through industrial specialisation poses new challenges to non-metropolitan areas and especially to small and peripheral regions, which already face several serious problems. If regional specialisation presupposes a certain critical mass, the spatial structure prevailing in the Nordic countries sets limits on maintaining and developing competitiveness through regional specialisation, although regional specialisation can be considered a relevant competitive strategy in densely populated areas in Western Europe.

3.2 Different types of industry clusters

It goes without saying that specialised regions can be grouped according to their different characteristics, and that possibilities for success differ decisively among these groups. In Finland, many middle-sized towns are characterised by process industries based on scale economies. Due to the location of natural resources and transportation routes there are numerous specialised industrial clusters in different parts of the country. Although the success of individual industries has been crucial to local economies, this kind of specialisation typically reflects the location choices of large production units in the wood processing and metal industries. This sort of specialisation has seldom generated growth in other industries. On the contrary, specialisation has demonstrated one-sidedness and vulnerability during structural changes and times when the competitiveness of export industries has deteriorated. For instance, several Finnish industrial regions specialised in the forest and metal industries have suffered from worse than average unemployment during the deepest crisis of the century in the Finnish economy in the early 1990s. Nor have employment figures improved as rapidly as could have been expected on the basis of growth in the value added of manufacturing industries. These problems can be linked to the definitions of network-based good agglomerations and bad agglomerations based on scale economies, as outlined by Hassink (1997).

One of the traditional spatially concentrated industries in Finland is furniture manufacturing. The biggest cluster of the industry is in the Lahti region where, in addition to the two biggest vertically integrated firms in the industry, dozens of smaller manufacturers are located. The furniture industry has been an important employer in the Lahti region and almost half the Finnish furniture was manufactured in Lahti as late as the 1970s. However, neither the furniture industry as a whole nor the furniture industry in Lahti has developed as well as could have been expected on the basis of the role of wood processing industries in the Finnish economy. Obviously, manufacturers of wooden furniture have not taken advantage of all the opportunities available. Finnish furniture manufacturing has not been based on product innovations or bold experiments; far too often designers rely on familiar and secure models. Partly as a consequence of these problems furniture exports are not rising to the same extent as furniture imports. Lack of cooperation has also been cited as an obstacle to favourable development. For instance, there is no joint organisation of furniture manufacturers. The furniture cluster in Lahti can be considered as an example of regional lock-in (see e.g. Maskell *et al.* 1998).

Recently, high technology industries have been portrayed as key factors when explaining growth. The success of high tech industries has also been crucial in Finland during the recovery from the severe

economic crisis of the early 1990s. These strongly growing technologically advanced sectors are concentrated in a few areas: in the biggest cities, Helsinki, Tampere, Turku and Oulu, and in the Salo region. Factors common to the cities include technical universities and various kinds of technology centres and science parks. The strong growth of Salo is based on the recent success of the telecom giant Nokia, which has also contributed to the growth in the other regions mentioned. Although backward and forward linkages to other sectors may have smaller multiplier effects than in certain other industries, the strong telecommunication clusters of Salo and Oulu have brought these regions into the group of fastest growing regions in Finland in the 1990s. However, the high tech route cannot be considered as a relevant alternative for the majority of regions. For instance, in 1993 a total of 85.0 percent of the employment in the four high tech industries (manufacture of drugs and medicines, office and computing machinery, telecommunication products and aircraft) was located in five of the 197 labour market districts.

One example highlighting the new regional growth based on specific skills is the success of the plastics industry in Joensuu. Most of the local firms in this industry were established in the 1990s and employment figures have doubled during this decade. Although the growth is based on individual successful firms, these firms have also had the support of local institutions. The plastics industry is emphasised in the regional development plan and the prerequisites for the industry have been promoted. Several new projects supporting favourable development and local SMEs operating in the plastics industry are under way. Development is in part supported by the local polytechnic, which is the only institute training plastics engineers in Finland. Because of the rapidly developing technology and institutions supporting the development of local firms, the plastics cluster of Joensuu can be considered both as a representative of the new form of dynamic industrial clusters and as an encouraging result of recent insights into factors of competitive advantage. However, this individual example does not necessarily mirror the general development; more knowledge on general trends is needed. Is there a tendency towards a more specialised regional production structure which is not limited to a set of traditional sectoral agglomerations, but also new regional production systems of competitive industries?

3.3 Regional policy

Although the prevailing spatial structure is a result of prolonged development characterised by inertia and path dependency, both spatial and industrial structures have undergone some considerable changes in Finland during the past few decades. From the 1960s onwards solutions were sought to the problems faced by peripheral regions in particular by means of regional policy. The emphasis was on levelling regional differences. Thus, there was also a need to maintain the prerequisites for

manufacturing industries in those regions which were burdened by out-migration. At the same time general interest was drawn to SMEs. Industrial and regional policy had a considerable effect on the location of manufacturing especially in the 1970s. Later on, supporting long-run development by promoting industrial restructuring was emphasised as the main objective of regional policy. In the 1990s levelling regional disparities has become contradictory to the growth and efficiency of the national economy. In this period of free movement of capital it has become difficult to justify supporting firms on a regional basis. In the same vein, industries facing problems can no longer be supported to the same extent in a period of abolition of barriers to trade as was previously the case. Industrial policy based on recurrent devaluations has also lost its relevance under EMU conditions. During the last few years supporting the general prerequisites for generating regional growth spirals has been stressed as the valid regional policy (Silander *et al.* 1997).

The change in the regional policy doctrine reflects the change in the role of regions, a recent Pan-European trend connected with European integration. National economies are seen as mosaic entities consisting of regions distinguished by unique features. Thus, regional development requires actions on a level where the strengths and weaknesses of the regions are best recognised. It has been argued that this means a lower level than central government. The institutional foundation of regional policy already changed when the central government lost authority at both the supranational and regional levels. Although the financial resources for regional development come from the Structural Funds of the EU, the regional administration level has, in addition to responsibility for regional development, considerable responsibility for allocating these resources.

The fact that regions have more influence on their own development will increase the importance of regional specialisation, for Porterian clusters of competitive industries are widely seen as a new form of regional growth. Limited resources are allocated to the strongest fields of expertise and specific knowledge. Although the firms themselves create their competitive opportunities, there is a growing need for those institutions having responsibility for regional development to remove obstacles to growth, and to develop infrastructure to improve the prerequisites for success. The importance of endogenous development is then increased by the fact that traditional industrial policy for supporting growth is replaced by technological expertise and know-how. However, because high tech-based growth is limited to certain urban areas regional disparities have increased. From the perspective of regional development a decisive issue is whether small and scattered centres can offer a dynamic economic environment for successful industries in order to permit endogenous growth based on regional specialisation to become a relevant alternative for these regions.

To sum up, the existence of several traditional specialised industrial regions in Finland mainly indicates a certain regional division of labour as well as locational requirements in the different phases of the product cycle. The prevailing regional structure has also been supported by traditional regional policy. However, major changes concerning competitive position, the prerequisites for regional division of labour, the nature of regional policy and development strategies have occurred in particular in the 1990s. With this as a background, there is a need to survey empirically whether these changes have increased the regional clustering of manufacturing industries.

4. Empirical findings

4.1 Data, indicators and periods

The empirical analyses are based on two data sets. The first data set includes information on Finnish industrial statistics in the years 1974-1993. In addition to 1974 and 1993, the detailed data cover the intermediate years 1980, 1985 and 1990, and include figures on employment and number of plants by region (labour market districts², N = 197) and industry (ISIC, 4-digit classification, 80 sectors). Although the regional division corresponds to the concept of functional region, many of the LMDs consist of small individual municipalities.

The second data set is based on the regional accounting of Statistics Finland³. The data covers the period 1988-1996 and contains information on the value added (current prices) of 15 manufacturing industries. The regional division is based on NUTS 4 (N = 85) and NUTS 3 (N = 20). Although both of these divisions are used in regional policies, they are not based on any systematic analysis of functionality. On the other hand, these delineations do not include as many very small units as the LMD data on the years 1974-1993.

The specialisation of local and regional economies is described by means of the following three indices: Theil entropy measure, Herfindahl index and location quotient⁴.

Because the observations are mainly based on a comparison between local and national economies, one has to bear in mind that the period under consideration is characterised by considerable changes concerning the industrial structure as well as industrial location. The figures in Table 1 reflect those changes.

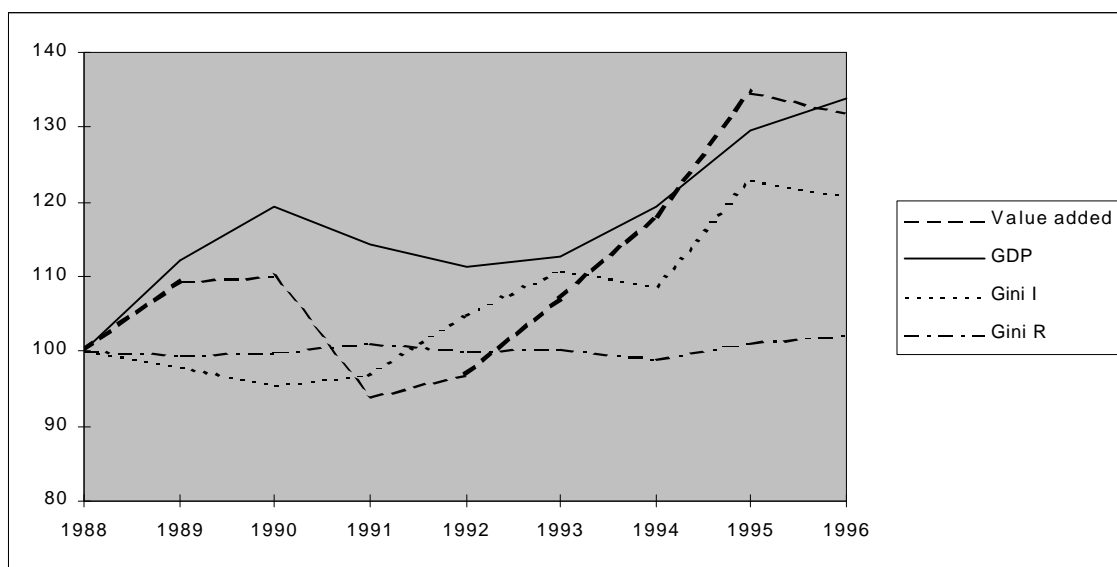
Table 1. Figures on manufacturing industries in Finland in 1974 and 1993 (source: industrial statistics).

FINLAND	1974	1993
Employment	526 518	342 843
Number of plants	6 273	5 839
Average size of plants	83,9	58,7
Gini coefficient (G_R)	0,426	0,408
Gini coefficient (G_{I80})	0,309	0,308
Gini coefficient (G_{I9})	0,193	0,217

The almost 20-year study period concerns both the last years of the growth of industrial employment in the late 1970s and a later turn towards the post-industrialised service and information society. The average size of plants decreased, implying the often highlighted increased importance of small and medium sized firms. According to the decreased Gini⁵ values describing the regional distribution of the manufacturing sector as a whole (G_R), manufacturing has shifted from traditional industrial areas to the less urbanised areas. This trend, rural industrialisation, is familiar to other Western countries as well. Although the Gini value describing the degree of sectoral specialisation did not change considerably when the 4-digit classification was used (G_{I80} ; 80 sectors), the Gini value calculated using the 2-digit classification (G_{I9} ; 9 sectors) confirms that a change towards increasing specialisation has occurred.

The second data set concerns an exceptional period in the development of the national economy, 1988-1996. This period contains both the last phases of the economic upturn of the 1980s as well as the deep recession of the early 1990s and the later rise from the depths of the depression. The development of both industrial value added and GDP is illustrated in Figure 1. The Gini value describing the regional concentration of manufacturing (G_R) increased slightly at the end of period. The Gini value describing the degree of industrial specialisation of the national economy (G_I) decreased at the end of the 1980s, implying extensive growth whereas the Gini value increased substantially during the recovery. When the value added of the manufacturing sector started to rise after 1991 the growth concerned a few expanding industries.

Figure 1. The development of value added of manufacturing, GDP, and Gini values in 1988-1996, 1988 = 100 (source: Statistics Finland, regional accounting).



4.2 Development from the 1970s to the 1990s: employment data

These observations concern 177 Finnish LMDs in which there was manufacturing in every year. As there are important disparities between the different sizes of regions, these LMDs were divided into five size categories according to the total number of persons employed in manufacturing in 1974. The percentage shares of the Finnish LMDs becoming either more specialised or more diversified in structure during the period are presented in Table 2. According to the Theil measures the trend was towards a more specialised industrial structure in 1974-1993. These increasing Theil values indicate the deepening regional division of labour. As can be seen in Table 2, differences between the size categories were quite small, even though specialisation was more prominent in groups iii and iv, which

consist of middle-sized towns and their surrounding areas. In spite of this, according to the Herfindahl indices calculated for the same period increasing regional specialisation cannot be considered to be the prevailing trend apart from group iv. Thus, part of the increase in Theil values can be attributed to the change in the industrial structure of the national economy, which may exaggerate regional changes. However, in various contexts (e.g. Isaksen 1996) the increasing importance of regional specialisation has been put forward as a characteristic special particular to the 1980s and 1990s. On the basis of previously outlined complex changes concerning competitive position, regional policy and development strategies it is reasonable to concentrate on development in the 1980s and 1990s.

Table 2. The percentage shares of LMDs becoming either more specialised or more diversified according to the Theil and Herfindahl indices in regions classified by the number of persons employed in manufacturing in Finland in 1974-1993 and 1980-1993.

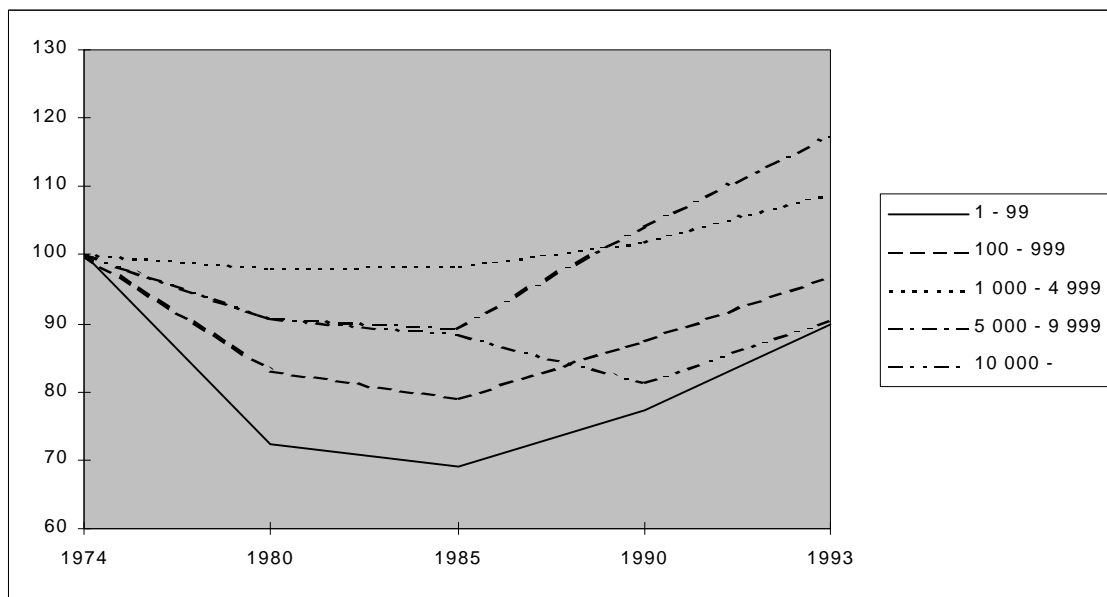
		THEIL				HERFINDAHL			
		1974-1993		1980-1993		1974-1993		1980-1993	
Category	N	-	+	-	+	-	+	-	+
i 1-99	48	39,6	60,4	20,8	79,2	50,0	43,7	31,2	68,8
ii 100-999	75	40,0	60,0	21,3	78,7	54,7	45,3	37,3	62,7
iii 1 000-4 999	30	30,0	70,0	13,3	86,7	46,7	53,3	30,0	70,0
iv 5 000-9 999	14	35,7	64,3	21,4	78,6	35,7	64,3	21,4	78,6
v 10 000-	10	40,0	60,0	10,0	90,0	70,0	30,0	60,0	40,0
	177	37,9	62,1	19,2	80,8	51,4	46,9	34,5	65,5

The observations concerning the years 1980-1993 reveal the increasing importance of regional specialisation. According to the Theil measure (see Table 2), increasing specialisation clearly characterises the period in all size categories and especially in group iii. Specialisation is also pronounced in group v, but the changes are somewhat smaller. Although the change in the structure of the national economy apparently has an effect on the Theil values, the change towards increasing specialisation can also be confirmed on the basis of increased Herfindahl values. Thus, increasing regional specialisation in 1980-1993 implies both the relative specialisation of local economies, i.e. differentiation from the structure of the national economy, and absolute specialisation, i.e. increasing one-sidedness.

As can be seen in Figure 2, which illustrates the evolution of the averages of the Herfindahl indices in each size category, the almost 20-year period under consideration obviously consists of sub-periods characterised by distinctive features in terms of employment development and factors affecting localisation dynamics. There is a clear-cut decrease in the average values in each

category at the end of the 1970s. In particular, the industrial structure of the smallest LMDs diversified, signifying that the rural industrialisation at the end of 1970s did not rest on specialisation. Considering the former one-sidedness of these regions, this is not a surprise. However, the diversification of the industrial structure characterises the development in other size categories as well. This can be explained by the considerable industrial restructuring. Although there was no marked change in the Gini value depicting the industrial structure of the national economy, the industrial renewal is confirmed by the employment changes of the 80 manufacturing industries averaging more than 20 percent from 1974 to 1980. During the first half of the 1980s the trend towards a more diverse production structure continued apart from category iii. However, during the second half of the 1980s the trend showed increasing specialisation in all categories except in the group of the biggest LMDs. Eventually, at the beginning of the 1990s the trend was definitely clear. In addition to the Herfindahl index, the turn towards increased industrial specialisation is indicated by the development of the average values of the Theil measure calculated for all regions (1974: 0.161; 1980: 0.150; 1985: 0.157; 1990: 0.164; 1993: 0.182).

Figure 2. The averages of the Herfindahl index in regions categorised by the number of persons employed in manufacturing in Finland in 1974-1993, 1974 = 100.



4.3 The connection between changes in specialisation and employment

In recent theories regional specialisation is typically associated with regional growth. However, this connection between specialisation and growth (measured by employment development) cannot be confirmed according to the results concerning Finland presented in Table 3. Although specialisation increased according to the Theil value in 74 of those 124 regions which outperformed the average employment development, the changes in the level of specialisation and employment did not have a statistically significant connection according to the χ^2 -test. This holds true for both indices. The correlations between the changes in the specialisation indices and the changes in employment shares were also near zero although slightly positive. The correlations calculated for the categories were only statistically significant in groups i (Theil: -0.234^{*}) and iii (Herfindahl: 0.294^{*}). The connection between the initial level of specialisation and employment change was also examined. In the whole data there was a positive connection between the variables (T: 0.230^{***}; H: 0.136^{**}). However, when examining the groups the only statistically significant correlations were negative in group ii (T: -0.278^{***}; H: -0.190^{**}).

Table 3. The connection between changes in regional specialisation and employment in Finland in years 1974-1993.

CHANGE OF EMPLOYMENT SHARE	N	THEIL		HERFINDAHL	
		-	+	-	+
+	124	50	74	65	56
-	53	17	36	26	27
	177	67	110	91	83

Even though increasing regional specialisation characterised the development in a considerable number of the regions, the indices used are general measures and do not reveal the sectors to which the changes are linked. The components of the indices moving in opposite directions may also cover notable changes, thus giving a distorted picture of development. By means of location quotients it is possible to identify potential industry clusters (henceforth PIC) (see e.g. Isaksen 1996). They can be defined as regional industrial agglomerations where the share of an industry exceeds the weight of that particular industry in the national economy⁶. Since the entire manufacturing employment in several LMDs is due to the location of a single plant, some further criteria are needed. Additional conditions may be such that 1) there has to be at least two plants in a region, and, 2) the number of employed persons has to exceed 100. In 1974 there were 319 potential clusters defined in this way and 302 in 1993. The growing importance of high technology sectors is manifested by the fact there were 10 potential clusters in 1974 and 19 in 1993. Although this method is purely quantitative, it is reasonable to assume that this reflects not only the growth of these industries but also the growing importance of regional specialisation and innovative networks - at least in the case of high tech.

If the criteria used to identify the potential clusters is further tightened to include a location quotient exceeding 3.0, at least three plants, and at least 200 employees in a particular industry in a local economy, the result is that the number of PICs remained almost unchanged (1974: 97; 1993: 101). However, it has to be kept in mind that during the period manufacturing employment decreased altogether by almost 35 percent - a considerable part of this is a result of more efficient working methods and a rise in productivity. Thus, it could be reasonable to relax the employment criterion in 1993. In addition, the location quotient criterion may eliminate industries too radically in the biggest LMDs - a dynamic industry cluster may be relatively small but nevertheless competitive. More importantly, plain numbers do not reveal the whole truth. Less than half of the PICs in 1993 were already part of this group in 1974. Although the number of clusters remained stable and the increasing specialisation indices do not necessarily reflect the growing importance of industry clusters but rather the poor success of less important industries, this simple observation reveals that there has been a substantial renewal of the production structure. These changes include the emergence of new industry clusters. New PICs emerged especially in the food and chemical industries (5 in both) and the biggest loss (5) concerned the textile industry.

If the criterion concerning the number of plants is further tightened ($N \geq 10$), it is reasonable to speak about actual industry clusters. The number of these clusters was modest (1974: 18; 1993: 16) altogether there were 10 clusters in this group in both years. The employment development of

these clusters was not very convincing: although the number of the firms in these clusters remained quite stable, the employment in these 10 clusters decreased by 60.3 percent. It is worth noting that there were 4 clusters in 1993 which represented furniture manufacturing.

4.4 Development in 1988-1996: value added data

Since increasing regional specialisation was a distinctive feature of regional development in particular at the beginning of the 1990s, this period was scrutinised more closely on the basis of another data set. The deep crisis characterising this period divided local and regional economies into losers and winners. This division became especially clear when the economy started to recover with the help of expanding export industries. In terms of value added disparities increased at the NUTS 3 and especially NUTS 4 level. Although the growth was remarkable in some regions, all NUTS 4 regions did not even reach the level of 1988.

Changes in the values of specialisation indices calculated for four groups categorised by the level of the value added in 1988 are presented in Table 4. According to the Theil value 62 of the total of 85 NUTS 4 regions became more specialised. Although the structure of the national economy underwent considerable changes, increasing specialisation cannot be explained by that alone. As a matter of fact, increasing specialisation was an even more pronounced feature characterising the period according to the Herfindahl index.

Table 4. The shares of NUTS 4 regions becoming either more specialised or more diversified according to the Theil and Herfindahl indices in regions classified by the value added level of 1988 in the years 1988-1996.

	THEIL			HERFINDAHL	
		1988-1996		1988-1996	
Category	N	-	+	-	+
i 1-99	15	20,0	80,0	13,3	86,7
ii 100-999	42	26,2	73,8	19,0	81,0
iii 1 000-4 999	25	32,0	68,0	40,0	60,0
iv 5 000-	3	33,3	66,7	0,0	100,0
	85	27,1	72,9	23,5	76,5

The correlation between the change in value added and the change in the Theil measure was 0.163^{*}, and correspondingly in the case of the Herfindahl index it was clearly positive, 0.502^{***}. In group i, which consisted of the smallest NUTS 4 regions, the considerable increase in regional specialisation correlated negatively with the change in the share of value added (T: -0.458^{**}; H: -

0.169). The development of this group is illustrated by the fact that its modest share of value added further decreased (from 1.0 percent to 0.9 percent). In this respect the development was analogous to group ii, whose share fell from 18.4 percent to 17.7 percent. In group iii specialisation increased especially in the rapidly growing centres of telecom industries, Salo and Oulu. In this group industrial performance was clearly linked to increasing specialisation (T: 0.718^{***}; H: 0.867^{***}). Excluding Salo and Oulu as outliers does not remove the statistically significant correlation (T: 0,492^{***}; H: 0,699^{***}). In part, this was affected by the fact that although value added increased in most of the traditional industrial cities, increasing diversification in some cities was connected to the decrease in value added. There was no statistically significant correlation between the level of specialisation and the change in the share of value added in any of the groups.

In spite of increasing specialisation, the importance of potential industry clusters did not clearly increase. There were 123 PICs in which the location quotient exceeded 3.0 in 1988 and 127 such clusters in 1996. Although the PICs of 1988 maintained their position as a group (their share grew from 28.1 percent to 28.5 percent), there were 58 PICs whose share fell. If the observations are limited to those PICs where the value added exceeded 100 million FIM in 1988, it is possible to identify 54 clusters. In 31 cases value added grew and in 18 of them the growth was more than 50 percent. On the other hand, the value added of 6 PICs decreased by more than 50 percent. Thus, this relatively short period was characterised by big changes in industrial structure: the fates of new and strong clusters and some traditional clusters deviated markedly from each other. The decreasing role of small NUTS 4 regions cannot be explained by the weak development of PICs in these regions. If industry clusters are not confined by other criteria than the location quotient value, their number in the group of small and one-sided regions is emphasised. There was no significant change in the number of PICs in either group i or ii. Nor did their share of value added of the whole manufacturing sector change from 1988 to 1996 (i: 0.5 percent; ii: 7.1 percent in both years). Thus, the weak performance of small NUTS 4 regions is not explained by the weak performance of PICs in these regions. However, the moderate performance of these clusters was not enough to compensate for the weak development in other industries in these NUTS 4 regions. Regional specialisation in these regions has not generated economic growth which would have spread to other sectors.

In addition to observations on the NUTS 4 regions some calculations were also made using the respective data on the NUTS 3 level. Increasing specialisation was the prevailing trend in these regions according to both indices. According to the Theil and Herfindahl indices, 15 and 13,

respectively, of the 20 NUTS 3 regions showed increasing industrial specialisation. The correlation between increasing specialisation and value added growth was positive (T: 0.288; H: 0.597^{***}). However, the correlation between the initial level of specialisation and growth was negative (T: -0.397^{**}; H: -0.308).

5. Conclusions

Although the recent theories concerning the causes of regional specialisation lay stress on different features of the phenomenon, they all point out that specialisation is an increasingly important competitive factor. According to both these theories and the empirical findings concerning individual cases, dynamic and innovative industry clusters can be seen as a solution for regions searching for feasible development trajectories when faced with increasing competition. Thus, specialisation is also considered a relevant competitive strategy for local and regional economies searching for their place in the global network economy. Guaranteeing endogenous, specialised economic growth by improving local milieu, infrastructure and networks connecting economic and social actors is, more commonly, also the objective of various local organisations responsible for regional development. Individual examples provide strong arguments for supporting the development of industry clusters.

This paper examines the changes in the degree of regional specialisation of local and regional economies in Finland, by means of simple indices depicting the industrial structure in the period of profound socio-economic changes, from the 1970s to the 1990s. Notwithstanding important qualifications, some conclusions are possible on the basis of the observations. When examining the entire periods and comparing the industrial structure of local economies to the production structure of the whole economy, a trend towards increasing regional specialisation was observed. On the other hand, when comparing the situations in the 1970s and in the 1990s, the industrial structures of the local economies have not specialised in the sense that they had become more one-sided. In contrast, the data available reveals that the observation period consists of shorter phases characterised by distinctive features.

Increasing regional specialisation has been the prevalent trend since the mid-1980s in all size categories of local economies apart from the group of the biggest urban regions. During the early 1990s the diversification of the industrial structure turned into increasing specialisation in the group of the biggest cities as well. Increasing regional specialisation implies, on one hand, a

dynamic process which is connected both to the deepening regional division of labour and the industrial restructuring of the national economy. On the other hand, local and regional economies also become more one-sided. This can be interpreted as follows: regional development is no longer based on diversified and extensive growth but on regional strengths - if there are any.

On the basis of changes concerning employment and value added figures, changes in regional specialisation are connected to divergent development in different categories of regions. In small regions, especially in the latter half of the period, increasing specialisation has been linked to weak industrial performance. Although specialisation in individual cases may indicate considerable growth and there are (potential) industry clusters in smaller regions, increasing regional specialisation has seldom generated extensive endogenous growth in these regions. In the group of medium-sized local economies changes in regional specialisation have correlated positively with the growth in value added, which, on one hand, relates to the growth of a few industry clusters, and, on the other, a decline in some traditional industrial areas.

On the basis of these observations it seems reasonable to argue that either generalisations concerning regional specialisation may somewhat exaggerate the importance of specialisation on regional growth or that because of the prevailing spatial structure regional specialisation is not as relevant a phenomenon in sparsely populated countries, such as Finland definitely is, as it may be in more densely populated areas. However, it has to be emphasised that in Finland increasing regional specialisation characterises a period of deep economic crisis and changes in industrial structure. The results may explain more about the characteristics of the period under consideration than the growth spiral based on specific knowledge and cooperation described in the literature. On the grounds of extensive statistical data it is impossible to say whether increasing specialisation implies such phenomena growing in importance as increasing cooperation, external economies or local business culture. It has to be kept in mind that although the total number of potential industry clusters as such has not increased, several new clusters showing indisputable growth have emerged to replace the declining ones. In addition, there has been growing interest in recent years in providing prerequisites for the growth of local production systems and competitive industry clusters in particular. In the long run the new forms of regional industrial policy and competitive strategies may generate endogenous regional growth based on local capabilities.

Endnotes

¹ Referring to Weber, Maskell *et al.* (1998) use the term ubiquitification, which, in addition to better accessibility of physical resources at the same cost and same time all over the world, refers to the transformation of information from a tacit and abstract form to one which can be utilised world wide.

² Regional classification used by Statistics Finland. LMDs are formed by combining local administrative units (municipalities) according to commuter rates. Because of the accuracy of regional and industrial classification, information for identification of regions was not accessible. The data also contains information for 1995. However, due to the change in industrial classification the information for 1995 cannot be compared with earlier information. The data from the Finnish industrial statistics were compiled for the purposes of the Nordic project “Regional Production Systems” (see Maskell *et al.* 1998).

³ The data were provided for the research project “Growth Factors and Regional Economic Disparities” (Lea Pelkonen and Sakari Ylönen, University of Joensuu).

⁴ The logarithmic Theil entropy measure is based on a comparison of two distributions:

$$T_r = \sum_i^n [X_i \log (X_i/Y_i)],$$

where X_i = the share of the sector i of the total industrial employment of the local economy
 Y_i = the share of the sector i of the total industrial employment
 X_i/Y_i = location quotient

The Theil index basically describes the deviation of the local industrial structure from the national structure. It is standardised to range from 0 to 1. A diversified local economy receives a value close to zero and a great value describes a specialised local economy.

The Herfindahl index is simply the sum of squared employment shares of industries calculated region by region:

$$H_r = \sum X_i^2.$$

⁵ $G_R = 0.5 - \frac{1}{n} [(\log(\text{cum } A_r) * (1/197) + (A_r * (1/197) * 0.5)]$, where A_r = the share of region r of the manufacturing employment; number of regions = 197.

⁶ For instance, if the location quotient exceeds 1.5 the share of that particular industry in a local economy is 50 percent bigger than its share in the national economy.

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