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Author(s): Schienstock, Gerd
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Regional Competitiveness: A Comparative Study on Eight European Regions

1. Introduction

Since Womack et al. (1990) published their book *The Machine That Changed the World*, in which they propagated the message that European car-makers have fallen far behind Japanese and also US firms, there has been animated discussion about international *competitiveness*. There is increasing evidence that a society's economic growth and social welfare is linked to its international competitiveness (Nelson 1992).¹ The concept of competitiveness is, however, not very well established although a lot has been published on this issue lately (Buckley, Pass & Prescott 1990; Nelson 1992; OECD 1996; Oxford Review of Economic Policy 1996; Hämäläinen 1998). There are only fragmented approaches, no comprehensive theoretical framework for analysing competitiveness has been developed so far. Major problems with the concept stem from the fact that the issue attracts researchers from different disciplines with varied research interests and approaches. They have focused on different aspects and levels of competitiveness (Buckley et al. 1990).

Particularly controversial is whether the notion of competitiveness can be used to analyse economic collectives, such as nations or regions. Krugman, for example, maintains that the concept of competitiveness becomes meaningless when applied to national or regional economies (Krugman 1994, 30). One could argue that economic collectives do not compete, at least not in the same way as companies do. There is no market on which economic collectives could compete. Competition, however,

takes place insofar as economic collectives try to influence the investment strategies of firms. By improving their setting of supportive organisations and institutions, economic collectives try to attract new and particularly innovative companies to settle in their territories and to keep strong local firms in their territory from moving production to other parts of the world. Taking this into account, Castells argues that competitiveness is an attribute of economic collectives, while for firms the traditional notion of 'competitive position' seems to be more adequate (1996, 86–).

Due to the globalisation of markets, competitiveness is more and more linked with innovativeness. Globalisation has caused the rules of the 'competition game' to change. Nowadays all global players must be capable of producing the required number of quality products, just-in-time, within a reasonable cost framework. Locally acting companies have to fulfil the same competition criteria pressured by their larger customers. However, these criteria develop more into entrance barriers to the global market, while economic success depends on the companies' capability to innovate rapidly and develop continuously new products that meet the demands of the customers. Customised innovation is the number one factor in global competition, particularly as the life cycles of products in some industries are decreasing quite drastically.

In the following, the concept of competitiveness will be used to evaluate the quality of regional innovation systems. So far, only few attempts have been made to analyse the functioning of a regional economy.² This paper is based on a company survey conducted in eight European regions in 1998. The following regions took part in the research project: Baden-Württemberg (Germany), Basque Country (Spain), Brabant (Netherlands), Centro (Portugal), Styria (Austria), Tampere Region (Finland), Wales (UK) and Wallonia (Belgium).³ Before presenting the

empirical results, I will shortly discuss the concept of region and the new role that the regions play in the globalising economy.

2. The new economic role of regions

The increasing globalisation of markets has changed the environment of companies significantly. They are confronted with intensive price, time, quality and innovation competition, not just abroad, but also at home. To stay competitive, companies cannot rely on exports only; instead, they are forced to look for the most supportive environment world-wide. Due to intensive global competition, companies break down their value chains into discrete functions and locate them wherever they can find specific local advantages (Ernst & Lundvall 1997, 11). This is not only true for larger companies; medium-sized supplier firms have to follow their customers in globalising their production process. New transport and information technologies facilitate the global organisation of companies' production and innovation processes.

Moreover, as production becomes more science-based, advantages like a developed research infrastructure, a highly qualified workforce or a culture open for innovation and technological progress are becoming more important as environmental factors than natural resources, which means that a supportive environment for innovative companies can be created deliberately (Pyke & Sengenberger 1992; Piore & Sabel 1994; Storper 1998). To become attractive for companies, regions and localities can set up specific institutions to support their innovation activities (Maskell et al. 1998). In this respect, it may be that 'region-states'⁴ are now more appropriate for designing supportive environments than nation-states. The 'region-state', as Ohmae (1995; see also Kennedy 1994) argues, is the 'natural' economic area since it represents genuine communities of economic interest and can take advantage of true linkages

and synergies (economies of scale and agglomeration) among economic actors. Regions may be more suited than nations to develop untraded interdependencies and relational capital as sustainable competitive advantages (Storper 1997, 19; Porter and Sölvell 1998; Howells 1999).

Although it has been suggested that regional economies are becoming more important, there is little consensus on how to define a region. It is important to mention that a regional classification is an intellectual concept. It exists only in terms of the criteria by which it is defined. The following four criteria are often used to define a region: (1) a region must not have a limited size; (2) it should display homogeneity in terms of specific criteria; (3) it can be distinguished from bordering areas by a particular kind of association of related features; and (4) it must possess some kind of internal cohesion (Cooke & Schienstock 2000). It is also important to mention that the boundaries of regions are not fixed once and for all; regions can change, new regions can emerge and old ones can perish. Therefore, to analyse a region, criteria that define a functioning unit within a specific time must be found.

From an economic perspective, the concept of 'industrial cluster' may be used to define a region (Porter 1990). Clusters are dense networks of economic actors, interacting closely and with intensive exchange relationships. The boundary of a region can be drawn where co-operation becomes less frequent. We can also argue that functioning regional economies need to have a common culture.

The economic criterion for defining a region became less reliable as large corporations restructured their activities on a global scale. Also, cultural homogeneity is less powerful than it once was. For the present, a tendency towards pragmatism has taken the lead in the field, especially in the European context in which administrative boundaries at the sub-national level

increasingly double as designations of regions. In instances such as the German Länder or even the Spanish and Italian cases, some degree of regional distinctiveness based on the effects of regional economic and other policies seems to be emerging. And among the policies which seem to have some influence in creating a new regional distinctiveness are those which support innovation within regional economies.

3. Indicators used in the research

The use of survey data to research competitiveness has often been criticised. The main argument against the use of this method has been that the collected data will be biased for several reasons, such as palliation, hiding strategies or simply different answering practices in filling in questionnaires. On the other hand, the survey method gives the opportunity to cover a broad range of different aspects of competitiveness. Surveys can give information on subjective judgements and objective facts. Both types of indicators will be used in our analysis on regional competitiveness. The subjective indicators reflect the competitive advantages that firms assume to have, compared with their competitors. Concerning the objective indicators, we distinguished between input indicators, such as R&D expenditure of companies, and output or performance indicators, such as innovations announced by companies. Furthermore, we used both static indicators, such as R&D expenditures measured by turnover, as well as dynamic ones, such as the development of R&D over a specific period of time. Concerning outputs, we used direct indicators, such as product and process innovations carried out by companies as well as indirect indicators, such as the development of employment and turnover in a specific period.⁵

For both input as well as output indicators, major measurement problems have been mentioned in literature

(Buckley et al. 1990; Hatzichronoglou 1996). Therefore, the concept of structural competitiveness indicating the development potential of regional economies has also been applied in the project (OECD 1990, 15). Here the focus is on criteria, such as skills level of employees and modernity of firms' techno-organisational structures; as these aspects represent competitive advantages difficult to copy, we may also use the term sustainable competitiveness (Porter & Sölvell 1998; Hämäläinen 1998). To apply a more dynamic perspective, the intensity of co-operation among firms and with support organisations is taken as an indicator for analysing competitiveness; we may speak of process competitiveness.

Table 1. Indicators of competitiveness used in the survey

Subjective indicators	<ul style="list-style-type: none"> – competitive advantages firms assume to have – strategies to sustain competitive advantages
<hr/>	
Objective indicators	
input factors	<ul style="list-style-type: none"> – R&D intensity (R&D budget by turnover and R&D personnel by the whole workforce) – changes in R&D budget and in R&D personnel
performance factors	<ul style="list-style-type: none"> – new product and process technologies – employment and turnover
structural competitiveness	<ul style="list-style-type: none"> – new organisation forms and management practices – qualification level of the workforce
process competitiveness	<ul style="list-style-type: none"> – co-operation among firms and between firms and supportive organisations

4. Empirical results

4.1 Subjective factors of competitiveness

Our research clearly indicates that European firms perceive quality as their most important competitive advantage. Nearly 80 per cent of all companies in the overall sample argue that their strength in global competition is the quality of their products or services. About 50 per cent of all companies assume they have an edge concerning time of delivery as well as innovativeness, and 40 per cent of all firms define after-sales services as their competitive advantage.⁶ On the other hand, only one third of all companies perceive themselves as being ahead in price competition. Likewise, very few companies define user-friendly products and ecological aspects as their competitive advantage.

These findings seem to indicate that firms in Europe have already adapted quite well to some post-Fordist competition criteria. On the other hand, they seem to have more problems in staying ahead in traditional price competition. Besides this, customer orientation is obviously a weak aspect of European firms' global competitiveness, indicated by the low share of companies that see user-friendliness of products and after-sales services as their advantage.

Concerning quality, the most frequently mentioned competitive advantage, European regions do not differ very much. Only in the Basque Country less than 50 per cent of all firms report a specific advantage in quality competition. Differences become bigger when we look at time of delivery, the second most important competition criterion mentioned by firms. Here Wales, Styria, Tampere Region and Centro share the first place, while Wallonia and Baden-Württemberg score rather low. If we look at innovativeness, Baden-Württemberg is the leading region, while the Basque Country and Brabant are far behind the other regions. Concerning price, the weakest competition criterion of

European firms, Wales is doing quite well, whereas Wallonia and Baden-Württemberg seem to have major problems.

Table 2. Competitive advantages by region (%)

Competitive advantage	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
Price	52	22	18	40	36	23	19	27	30
After-sales service	43	63	37	28	29	19	52	59	40
Quality	85	82	73	72	78	46	84	86	76
Time of delivery	65	66	45	58	66	51	49	63	59
Technical standards/ Innovativeness	68	75	54	34	46	30	86	59	56
User-friendly products	31	25	8	17	32	12	41	27	25
Ecological aspects	15	25	9	8	20	10	21	27	17
Other advantage	6	16	11	9	14	8	3	4	10
(N)	(103)	(107)	(89)	(86)	(139)	(78)	(81)	(56)	(739)
Competitive advantadvantages*	3.6	3.7	2.6	2.7	3.2	2.0	3.5	3.5	3.1

* Average number of competitive advantages per firm in region of eight competitive advantages

Based on the firms' own judgement about their competitive advantage, we can distinguish between four types of companies:⁷ innovators, strong competitors, weak competitors and marketers. The 'strong competitors' represent the biggest group of firms, whereas the firms characterised as 'innovators' form the smallest one.

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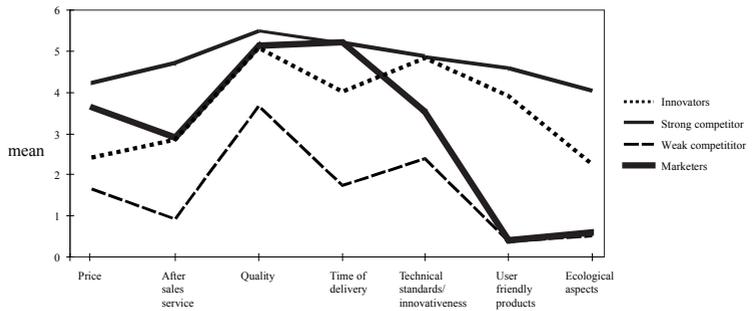


Figure 1. Profiles of companies' statements on their competitive advantage

One third of all companies in Baden-Württemberg can be characterised as 'innovators', by far the biggest share in all regions. In Brabant, there are only few 'innovators' (8%); in this region the 'marketers' form the biggest group (38%). We can find the same share of 'marketers' in Wallonia; this region also has the biggest share of 'weak competitors' (35%). More than 50 per cent of all companies in Centro classify themselves as 'strong competitors', here only Styria comes close.

Table 3. Region by strategic groups (%)

Region	Cluster				(N)
	1. 'Innovators'	2. 'Strong comp.'	3. 'Weak comp.'	4. 'Marketers'	
Wales (UK)	19	38	16	28	(101)
Styria (AU)	20	45	6	30	(107)
Wallonia (BE)	18	9	35	38	(87)
Brabant (NL)	8	26	28	38	(86)
Tampere (FIN)	14	33	27	25	(139)
Basque Country (SP)	17	21	32	31	(78)
Baden-Württemberg (GER)	33	32	22	12	(81)
Centro (PRG)	18	54	11	18	(56)

European companies obviously see a skilled workforce as a guarantee to sustain their competitive advantages. Nearly three out of four companies mentioned a skilled workforce as an important factor that can help them compete successfully on the global market. To increase R&D is also seen by companies as a promising measure to keep up with their competitors. The third important factor in sustaining competitiveness is organisational restructuring. Although companies admit being rather weak concerning customer orientation, they are still not prepared to put more emphasis on marketing.

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Table 4. Measures to sustain competitive advantages (%)

Strategy	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden- Württem- berg (GER)	Centro (PRG)	
Internal R&D	49	51	45	34	66	42	68	39	51
Owning basic patents/ licenses	18	12	18	4	3	12	21	7	12
Marketing	39	37	31	22	66	19	42	41	39
Skills/knowledge of labour force	70	70	67	73	85	27	67	41	66
Organisation of production	58	39	61	25	50	39	49	66	48
Close co-operation with firms	55	46	30	26	50	27	28	18	38
Support of other institutions	21	5	6	6	18	4	3	5	10
(N)	(103)	(105)	(87)	(82)	(139)	(74)	(81)	(56)	(727)

On the regional level some differences occur. Companies in the Tampere Region in particular stress that to have a highly skilled workforce is an important strategy in sustaining competitiveness (85%), whereas in the Basque Country (27%) and in Centro (41%) less than a half of all companies are of the same opinion. In Baden-Württemberg (68%) and in the Tampere Region (66%), many companies give high priority to increasing R&D as a strategy to sustain competitive advantages. Tampere Region is the only region where more than 50 per cent of all companies mention improvement of marketing as an important strategy in this respect. Particularly, companies in Centro (66%), Wallonia (61%) and in Wales (58%) perceived organisational restructuring as a promising strategy to sustain competitiveness.

4.2 The analysis of objective indicators

4.2.1 Input factors: R&D -related indicators

As has been said earlier, the analysis of objective factors of global competitiveness may include different types of factors. I first concentrate on input factors; these are factors related to R&D activities.⁸ Although most regions faced a severe crisis during the 1990s, only few companies in the overall sample reduced their R&D activities during 1990–1995, regardless of whether we choose the R&D budget or R&D personnel as an indicator. Only some 10 per cent of all companies reduced their R&D budget or R&D personnel during that time, while at the same time nearly 70 per cent of all companies spent more money on R&D, and some 50 per cent of all companies increased their R&D personnel.

We must admit, however, that the R&D intensity of companies is often rather low. Some 40 per cent of the companies which mentioned that they perform R&D activities must be characterised as less R&D-intensive in 1995, whether we consider the R&D budget by turnover or R&D personnel by the whole workforce. On the other hand, some 30 per cent of all companies can be classified as R&D-intensive if we choose the R&D personnel indicator and about 35 per cent if we look at the R&D budget indicator.

Baden-Württemberg has by far the highest share of R&D-intensive companies measured by the R&D budget related to turnover in 1995, while only about 15 per cent of all companies in this region must be judged as less R&D-intensive. The opposite situation can be found in Centro. Only 10 per cent of all companies in this region show high but nearly 60 per cent low R&D intensity. The situation in Brabant is quite similar; here more than 60 per cent of all companies have an R&D budget that is below 1 per cent of their turnover. A more polarised

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situation can be found in most other regions. If we measure R&D intensity by the share of R&D personnel compared to the whole workforce, we get a slightly different picture. Here Baden-Württemberg is placed only in the middle of the sample. In Centro, which is placed last in this respect, two out of three companies must be judged as showing low R&D intensity. Wales (53%) also has a rather high number of less R&D-intensive companies.

Table 5. R&D intensity (R&D budget of turnover and R&D personnel of whole workforce) in 1995 by region (%)

R&D intensity	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
R&D budget intensity*									
Low	58	30	42	62	33	43	16	57	39
Medium	11	28	27	15	33	23	27	33	25
High	31	42	31	23	35	33	56	10	36
(N)	(84)	(81)	(52)	(26)	(89)	(30)	(68)	(21)	(451)
R&D personnel intensity**									
Low	53	39	41	40	38	48	26	65	43
Medium	18	27	38	14	27	39	47	19	28
High	30	34	22	46	35	13	27	16	29
(N)	(95)	(70)	(37)	(35)	(92)	(31)	(62)	(37)	(459)

* Low $x \leq 1$, medium $1 < x \leq 4$, and high $x > 4$ per cent of turnover.

** Low $x \leq 3$, medium $3 < x \leq 10$, and high $x > 10$ per cent of total number of employees.

Baden-Württemberg, although very R&D-intensive, has the highest share of companies having reduced their R&D budgets (23%) and/or their personnel (33%), followed by Styria. On the other hand, in the Tampere Region more than 80 per cent of all companies show an increase in their R&D budgets, and about 70 per cent in their R&D personnel.

Table 6. R&D budget and personnel changes 1990–1995 by region (%)

R&D change 1990–1995	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden- Württem- berg (GER)	Centro (PRG)	
Decrease in R&D budget	1	15	4	–	6	4	23	–	8
Stability in R&D budget	56	16	17	48	11	26	9	47	26
Increase in R&D budget	43	69	79	52	82	70	67	53	66
(N)	(77)	(55)	(48)	(21)	(79)	(27)	(64)	(15)	(386)
Decrease in R&D personnel	6	12	3	–	6	9	33	4	10
Stability in R&D personnel	61	40	40	71	27	50	23	39	41
Increase in R&D personnel	33	48	57	29	67	41	44	57	48
(N)	(87)	(50)	(30)	(24)	(89)	(22)	(61)	(28)	(391)

4.2.2 Output indicators

4.2.2.1 Direct indicators: Innovativeness

Among the output-related indicators of competitiveness, innovativeness measured by the reported new products and process technologies is the most important one.⁹ Some 25 per cent of all companies in the overall sample introduced no innovation, neither new products nor new processes in the last three years (1992–1995). The share of non-innovative firms increases quite significantly if we only count the innovations new to the market; then 50 per cent of all companies in the overall sample must be judged as non-innovative.

The companies that have introduced both new products and new process technologies during the last three years can be defined as highly innovative firms. It is often the case that major product innovations can only be introduced if new process technologies are installed at the same time. If we count innovations new to the company, we can classify nearly 40 per cent of all companies as highly innovative. The number of companies having introduced both products and process technologies new to the market is, of course, significantly lower; then only 10 per cent of all companies can be classified as highly innovative.

The highest share of non-innovative companies can be found in Brabant. About 50 per cent of all companies in this region did not introduce any type of innovation, neither new products nor new process technologies during the last three years. This share increases significantly if we count only innovations new to the market; then three out of four companies in Brabant were not innovative. The distance to the other regions is quite significant. Surprisingly, the greatest share of highly innovative companies can be found in Centro; here more than 50 per cent of all companies report introducing both process and product innovations during the last three years, while only 10 per cent of all companies in the

region must be judged as non-innovative. The picture changes slightly if we only look at innovations new to the market. Here the share of non-innovative companies is lowest in Baden-Württemberg (34%). At the same time, more than 50 per cent of all companies in this region introduced product innovations that are new to the market, either alone or together with new process technologies.

Table 7. Introduction of innovations in the last three years (1992–1995) by region which are new to the firm and which are new to the market (%)

Innovation	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
New to firm									
No	25	23	19	50	18	21	22	11	24
New process	13	10	7	13	6	8	–	13	9
New product & new process	39	33	35	15	42	49	39	54	28
New product	24	34	39	22	34	22	39	23	30
(N)	(102)	(97)	(83)	(82)	(138)	(72)	(79)	(56)	(709)
New to market									
No	46	44	47	73	59	65	34	45	52
New process	9	7	8	6	12	6	–	7	7
New product & new process	11	14	10	2	9	8	13	16	10
New product	34	34	35	18	21	21	53	32	31
(N)	(102)	(97)	(83)	(82)	(138)	(72)	(79)	(56)	(709)

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The question of whether R&D intensity has an impact on the innovativeness of companies is one frequently addressed in relevant literature. Based on our research, we can conclude that such a relationship indeed exists. Among companies with low R&D intensity, we can find the highest share of non-innovative firms (about 35%). Regardless of which indicator we choose, the figure is about 10 per cent only among companies investing more or heavily in R&D. Companies having introduced new product and process technologies concurrently can be more often found among firms with medium or high R&D intensity, again regardless of the chosen indicator. This trend becomes even more evident when we look only at innovations new to the market.

Table 8. Introduction of innovation by R&D intensity (%)

Introduction of innovation	R&D budget intensity				R&D personnel intensity			
	Low $x \leq 1$	Medium $1 < x \leq 4$	High $x > 4$	Total	Low $x \leq 3$	Medium $3 < x \leq 10$	High $x > 10$	Total
Introduction of innovation new to the firm								
No	32	13	11	20	29	9	14	19
New product	26	39	35	33	25	36	39	32
New product and new process	30	43	49	40	35	51	41	41
New process	12	6	5	8	12	4	6	8
	100%	100%	100%	100%	100%	100%	100%	100%
(N)	(172)	(110)	(156)	(438)	(192)	(124)	(132)	(448)
Introduction of innovation new to the market								
No	62	46	33	48	60	44	42	50
New product	26	36	43	34	25	36	36	32
New product and new process	7	12	17	12	8	14	14	11
New process	6	7	6	6	7	7	8	7
	100%	100%	100%	100%	100%	100%	100%	100%
(N)	(178)	(110)	(156)	(438)	(192)	(124)	(132)	(448)

2.2.2.2 Indirect indicators: Employment and turnover

The development of employment and turnover, of course, is only indirectly related to innovation activities. Still, it is useful to integrate these aspects into the analysis of regional competitiveness. An indicator was used¹⁰ which compares the development of turnover with the development of employment during the last five years (1990–1995). Slightly more than 20 per cent of all companies in the overall sample can be characterised as rapidly growing firms with an increase in turnover and employment of more than 50 per cent in five years. Brabant has by far the highest share of these rapidly growing firms (36%). Styria (14%), Wallonia (15%), Baden-Württemberg (16%) and Centro (18%) have a comparably low share of such dynamic firms. If we take into account all companies that have increased turnover and employment, Wales (64%), Brabant (68%) and the Tampere Region (64%) are ranked highest, while Baden-Württemberg (37%) has the lowest share. On the other hand, by far the greatest share of companies with decreasing turnover and employment can also be found in Baden-Württemberg (38%), followed by Wallonia (25%).

Table 9. Turnover and employment change 1990–1995 by region (%)

Turnover & employment change	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
T+&E+ over 50%	32	14	15	36	24	25	16	18	22
T+&E+	32	33	44	32	40	28	21	38	34
T+&E-	26	36	15	26	25	35	25	27	27
T-&E-	11	17	25	7	12	13	38	18	18
(N)	(66)	(66)	(59)	(31)	(96)	(40)	(68)	(34)	(460)

When looking at the relationship between R&D intensity and the indirect output indicator, no clear trend can be identified. Our findings suggest that firms with high personnel R&D intensity may see a slightly more dynamic growth of turnover and employment. We can also find some indication that the more innovative firms are also the more dynamic ones. Furthermore, we can find the highest share of companies having lost turnover and employment during the last five years among the companies not having introduced any innovation, whereas the share of very dynamic companies with an increase of more than 50 per cent in both turnover and employment is highest among the very innovative companies which have introduced new products and new process technologies concurrently.

4.3 Structural and process competitiveness

The concepts of structural competitiveness and process competitiveness have been introduced in order to analyse the regional development potential. The qualification level of the workforce, the application of modern ICTs as well as the introduction of new organisation forms and management practices have been used as indicators to analyse structural competitiveness. In the evaluation of process competitiveness, co-operation patterns and co-operation intensity have been used as indicators.

4.3.1 Qualification of the workforce

We have already mentioned earlier that companies of almost all regions rely heavily on the skills and competencies of their workforce to keep or improve their position on the global market. Therefore, to evaluate structural competitiveness, an indicator combining the educational level and the actual qualifications of the workforce has been applied.¹¹ In the overall sample, the

share of companies with a predominantly unskilled workforce is 32 per cent; more than 40 per cent of all companies employ a majority of skilled workers. On the other hand, less than 10 per cent belong to the category with a majority of highly educated workers having a university degree.

The share of the companies with more than 50 per cent unskilled workers is the highest in Centro (50%), Wales (49%) and Wallonia (48%), which means that these three regions must be defined as less competitive. On the other hand, Baden-Württemberg (11%) and Brabant (8%) can be characterised as highly competitive if we take the skills level as an indicator of structural competitiveness. We have to stress, however, that in Baden-Württemberg we can find only very few companies with a majority of well-educated workers, in other words in which more than 50 per cent of the workforce has a university degree. Here Styria and Wales dominate (11% and 13%).

Table 10. Qualification level within companies by region (%)

Qualification*	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
Highly educated	11	13	2	7	8	7	4	–	7
Further educated	13	23	2	49	5	34	6	5	21
Skilled	27	41	23	37	50	24	80	45	41
Unskilled	49	23	48	8	37	36	11	50	32
(N)	(75)	(87)	(52)	(74)	(96)	(62)	(55)	(40)	(541)

* % of firms in which $\geq 50\%$ of the personnel belong to one of the categories

4.3.2 New organisation forms and management practices

By using the number of new organisation forms and management practices introduced by firms, we can get an impression to what extent companies have become more flexible and decentralised. The overall picture shows that only some 10 per cent of all companies applied restructuring practices more extensively while, on the other hand, nearly 50 per cent of all companies had hardly started with such a renewal process.

Table 11. Introduction of organisational practices by region (%)

Number of introduced organisational practices	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
None or few	46	42	47	51	44	47	42	48	45
Some	39	45	42	42	39	42	53	36	42
Many	15	13	11	8	18	10	5	16	12
(N)	(102)	(98)	(83)	(67)	(142)	(78)	(81)	(56)	(707)
Av. number of org. practices per firm	4.3	4.6	4.1	3.7	4.3	3.9	4.2	4.2	4.2

In our analysis, we differentiate between three types of new organisation forms and management practices¹²: those that are related to the setting up of intra-organisational network structures, those that indicate the evolution of inter-organisational networks, and those that have been introduced to secure high quality production. Besides this, we will analyse to what extent companies have introduced modern ICTs, assuming that through increased technological connectivity, exchange of knowledge and information will grow, which will then speed up the innovation process.

Companies in Europe focus their organisational renewal activities more on new intra-organisational and new quality practices than on new inter-organisational practices. Looking at each new organisational practice separately, we can see that only total quality management, group work and ISO 9000 ff were introduced by more than 50 per cent of all companies. On the other hand, inter-organisational networking, the concept of system suppliers, outsourcing and interdisciplinary development/design teams were introduced by less than 25 per cent of all firms, which again indicates that companies are particularly slow in transforming their inter-organisational forms of market-based co-operation into more stable network-like relationships.

We cannot find major differences concerning the introduction of new organisation practices at the regional level. While companies in Brabant seem to be ahead in transforming their inter-organisational market-based relationships into network relationships, companies in Styria, the Tampere Region and Baden-Württemberg have progressed most in turning their intra-organisational bureaucratic into an internal network structure. Companies in Wallonia, the Basque Country, Centro Region and Wales seem to take quality more seriously than companies in other regions, as they have introduced quality standards such as ISO 9000 ff or total quality management more often than firms in other regions. Concerning the introduction of new ICTs, companies in the Tampere Region and in the Basque Country are in a leading position.

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Table 12. Introduction of new organisational practices (%)

Organisational practice	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
Total quality management	52	36	59	46	43	67	51	65	51
Group work	29	60	53	58	59	61	50	47	52
Profit or cost centres	45	26	36	30	32	21	29	57	34
Inter-organisational networking	15	25	15	27	30	10	11	18	20
Benchmarking	32	29	53	9	22	29	9	51	28
Flat hierarchies	33	72	11	52	49	13	74	29	43
Interdisciplinary design teams	25	14	17	6	46	14	20	24	23
Just-in-time delivery	46	37	68	39	30	49	24	37	41
Outsourcing	22	34	13	47	15	16	41	14	25
System suppliers	9	18	10	15	15	7	19	35	15
ISO 9000 ff	72	61	54	23	57	79	69	53	59
Information technology	61	51	25	23	73	69	25	31	48
(N)	(100)	(97)	(83)	(66)	(130)	(70)	(80)	(51)	(677)
Ave. number of external practices	0.9	1.1	1.0	1.3	0.8	0.7	0.9	0.9	1.0
Ave. number of internal practices	1.3	1.7	1.2	1.4	1.7	1.0	1.7	1.4	1.5
Ave. number of quality practices	1.5	1.2	1.7	0.8	1.1	1.6	1.3	1.5	1.3

It is often argued that modern ICTs can be seen as opening up opportunities for introducing new and more flexible organisation forms (Fulk & DeSantis 1993; Schienstock 2000). They support the development of a new network economy. From our findings, however, we can draw the conclusion that those companies that have introduced modern ICTs have not yet taken advantage of the flexibility potential of these technologies. They have not been more radical in organisational restructuring than those companies not having introduced new ICTs.

4.3.3 Co-operation patterns

Firms can start co-operating with other firms and support organisations for two reasons: to stay informed about new technological developments or to get support in concrete innovation processes. Our findings clearly demonstrate that, in both cases, firms are much more important as co-operation partners than supportive organisations. For example, 50 per cent of all companies report customer firms and 36 per cent supplier firms as important sources of staying informed about innovation opportunities, while all types of support organisations are mentioned as a key information source only by some 10 per cent of all companies.

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Table 13. Source of information on innovation by region (%)

Source	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden- Württem- berg (GER)	Centro (PRG)	
Journals/technical literature	52	55	45	29	39	23	52	54	44
Conferences/ exhibitions/fairs	43	57	54	24	50	46	70	69	51
Customer firms	45	55	30	51	59	50	70	30	50
Supplier firms	40	50	39	25	35	29	26	35	36
Consultants	9	4	3	5	6	6	1	10	5
Industrial associations	21	4	12	10	10	13	12	13	12
Technology transfer agency	4	2	2	3	6	26	6	9	7
Universities	19	15	13	8	15	6	7	4	12
Higher education institutes	8	–	2	1	1	3	4	–	2
Other	10	11	6	3	6	3	4	4	6
(N)	(103)	(105)	(87)	(75)	(135)	(70)	(81)	(54)	(710)

Firms are even more important as partners in concrete innovation projects. There are only few firms that do not co-operate more directly in one way or the other with customer firms (12%) or suppliers firms (25%) in innovation processes. Among the supportive organisations, universities (39%) and consultants (35%) are the most important co-operation partners for firms in innovation processes.

Table 14. Main partner in innovation processes by region (%)

Main partner	Region								Total
	Wales (UK)	Styria (AU)	Wallonia (BE)	Brabant (NL)	Tampere (FIN)	Basque Country (SP)	Baden-Württemberg (GER)	Centro (PRG)	
Customer firms	82	95	63	96	93	85	99	85	88
Supplier firms	72	76	75	64	65	82	85	94	75
Consultants	36	43	26	16	17	50	56	58	35
Contract research organisations	17	40	9	3	32	44	53	52	30
Universities / HEIs	39	51	34	16	30	37	53	64	39
Technology transfer institutions	11	20	9	10	6	63	48	44	22
Providers of (venture) capital	11	31	1	18	12	13	38	42	19
Providers of subsidies	19	50	28	18	33	2	44	50	31
Government agencies	32	19	22	12	4	41	38	48	24
Trade associations, similar institutions	24	46	22	22	7	22	44	50	27
Training programmes /institutions	26	33	17	15	9	46	38	60	27
Other	8	15	8	3	3	2	11	10	7
(N)	(100)	(93)	(76)	(67)	(138)	(54)	(73)	(52)	(653)

If we look at co-operation among companies within innovation projects, we can hardly find regional differences. For companies in Wallonia (63%) customer firms are less important as co-operation partners than they are for companies in other regions. The same is true for companies in Brabant (64%) and the Tampere Region (65%) with respect to supplier firms. Regional differences become

more visible when we look at firms as sources of innovation-related information. Customer firms (70%) are most often mentioned by firms in Baden-Württemberg as important sources of staying informed about technological progress, while the share of companies that see supplier firms as key informants on innovation opportunities is the highest in Styria (50%).

Only in some regions, mainly Wales and the Basque Country, can we find single supportive organisations that play a significant role as a source of information on technological progress. In Wales, these are industrial associations (21%) and universities (19%), and in the Basque Country, these are technology transfer agencies (26%). When looking at support organisations as partners in concrete innovation projects, regional differences become more significant. Companies in Baden-Württemberg, the Basque Country and Styria mention supportive organisations more often as key partners in innovation projects and processes than companies from other regions.

No more than 10 per cent of all companies use universities as important sources of staying informed about technological progress. The share of companies co-operating is higher than the average in Wales (19%) and particularly low in Centro (4%). Of all companies, 40 per cent mention universities as key partners in innovation processes. Here we can find companies in Centro in a leading position, as 2/3 of all companies see universities as a key partner in the development of new products and process technologies. But also in Baden-Württemberg and in Styria more than 50 per cent of all companies mention universities as key partners in innovation projects. In the Tampere Region and in Wallonia, this group comprises only about 30 per cent of all companies, and in Brabant this group is even smaller (16%). In general, companies prefer to co-operate with regional and national universities. Only in Styria and to a lesser extent in the Basque Country, companies have chosen more often universities

from other European countries and from abroad as their main co-operation partners in innovation processes (43% and 17%).

4.3.4. Co-operation intensity

There are only two regions, Centro (46%) and Styria (43%), in which more than 40 per cent of all companies are co-operating quite extensively with other firms. Wallonia, on the other hand, has the highest share of non-co-operating firms (27%). The number of firms that co-operate intensively with support organisations is the highest in Wales (24%), Styria (21%), the Basque Country (23%) and Centro (19%). The other extreme is represented by Wallonia and by Brabant in particular; in Brabant only 2 per cent of all companies co-operate extensively, while the great majority of companies in the region (62%) have hardly any contact with supportive organisations.

In general, co-operation of companies with universities is not very intensive; three out of four companies have only weak ties with universities, if any. Only in Styria can we find a significant number of companies that co-operate quite extensively with universities (26%). At the other end we have Brabant and Centro, both regions in which about 90 per cent of all companies have only little or no contact with universities.

When we look at the relationship between co-operation and innovativeness, we can identify a clear trend: intensive co-operation of any kind has a positive influence on firms' innovation activities.

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Table 15. Co-operation intensity by innovations new to the firm and new to the market (%)

Co-operation	Innovations new to the market									
	No	New product	New product & new process	New process	(N)	No	New product	New product & new process	New process	(N)
Overall co-op.										
Low	35	32	25	8	(229)	63	25	6	6	(229)
Medium	19	32	39	10	(277)	48	31	13	7	(277)
High	10	27	55	8	(184)	40	39	13	9	(184)
Co-op. with firms										
Low	33	22	34	12	(101)	56	27	7	10	(101)
Medium	22	36	33	9	(324)	54	32	9	5	(324)
High	12	29	52	8	(231)	41	36	14	9	(231)
Co-op. with organisations										
Low	28	35	28	10	(267)	59	29	7	6	(267)
Middle	15	32	46	7	(263)	42	37	13	8	(263)
High	8	26	56	10	(98)	42	35	14	9	(98)
Co-op. with univ.										
Low	26	32	32	10	(484)	57	28	9	6	(484)
Middle	12	22	60	6	(123)	33	39	16	12	(123)
High	6	36	50	8	(72)	32	47	11	10	(72)

4.4 Regional profiles

The following table gives an overview of the advantages and disadvantages of the regions involved in the survey.

Regional profiles

	Wales	Styria	Wallonia	Brabant	Tampere	Basque Country	Baden- Württem- berg	Centro
Competitive advantage								
price	++	-	-	+	+	-	--	=
quality	+	+	=	-	=	--	+	+
innovativeness	+	++	=	--	-	--	++	=
Challenges faced by companies								
price	+	++	+	--	-	=	++	-
quality	-	=	=	-	=	=	+	++
technological challenge	+	+	=	-	--	=	++	+
market dynamics	+	++	-	=	=	-	-	=
Measures to sustain comp. advantage								
R&D	=	=	-	--	++	-	++	-
skills	=	=	=	+	++	--	=	-
Responses to challenges								
organisational restructuring	++	=	++	-	+	-	-	--
cutting costs	=	=	+	--	-	=	++	=

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	Wales	Styria	Wallonia	Brabant	Tampere	Basque Country	Baden- Württem- berg	Centro
Input factors:								
R&D								
R&D budget decreasing ¹⁾	-	+	=	-	=	=	++	-
R&D budget increasing ²⁾	--	=	++	-	++	=	=	-
R&D budget intensity	=	=	=	-	=	=	++	--
Output factors:								
Innovation								
new products to the market	=	+	=	--	-	-	++	+
Turnover and employment								
incr. in turnover and employm. > 50%	+	=	-	+	=	=	-	=
decr. in turnover and employment ³⁾	-	=	+	-	-	-	++	=
Structural indicators								
unskilled workers ⁴⁾	++	-	++	--	=	=	--	++
introduction of new organisation forms	=	+	=	-	=	-	=	=
Co-operation								
with firm	=	+	-	=	=	=	=	+
with support organisations	+	+	-	--	=	+	-	=
with university	=	++	=	--	=	=	=	--

¹⁾ fewer companies than on average have decreased their R&D budget

²⁾ fewer companies than on average have increased their R&D budget

³⁾ fewer companies than on average have decreased turnover and employment

⁴⁾ fewer companies than on average have a mainly unskilled workforce

5.6. Conclusions

The results of the research are somewhat puzzling. The picture they give is far from clear. Baden-Württemberg, a region with companies showing the highest R&D intensity has at the same time the highest share of companies which lost turnover and reduced their workforce. Another region, Brabant, in which the number of non-innovative firms is extremely high and in which companies do not assess themselves to be very competitive regarding innovativeness, has the highest share of very dynamic companies that have increased both turnover and employment by more than 50 per cent within a period of five years. Centro, a region with a fairly large share of companies with a predominantly unskilled workforce is the most innovative region according to the judgement of the firms themselves. In the case of the Tampere Region, where companies show a fairly high dynamics in R&D activities, innovativeness, at least if we only count products and process technologies that are new to the market, is comparatively low.

All these examples demonstrate that global competitiveness is a rather complex phenomenon that cannot adequately be analysed by one-dimensional measures. If we apply a multidimensional concept, however, it becomes less clear, which regions are more and which are less competitive. One can also have some doubts as to whether a clear distinction between 'high road' regions and 'low road' regions (Pyke & Sengerberger 1992, 12–) can be drawn. Based on our results, we may classify Styria and Baden-Württemberg as high road regions, whereas the Basque Country, Wallonia and Centro may be characterised as low road regions. However, regional strategy formation is obviously more complex, as most regional strategies include high road as well as low road elements.

Our research findings seem to indicate that for regions there is no 'one best way' towards global competitiveness. Regions are different and they may be forced to apply different strategies to retain or regain global competitiveness. At least two aspects have to be taken into account in this respect: structural differences and differences in the stage of economic development. The first aspect concerns, for example, the industrial and size structure of companies in the region. With respect to the second aspect, we have to take into account that regions with newly emerging industrial clusters need other development strategies than regions with maturing industries. Regarding the first aspect, Brabant is a good example. The sample characterises Brabant as a region with a clear focus on small and medium-sized firms. One may have doubts whether for companies of this size the capability to innovate continuously can become a competitive advantage at all, as innovating is often also a very costly undertaking. For small supplier companies it may be more important to improve the quality of their products and to deliver their products and services more rapidly to their customer firms.

Concerning the second aspect, we may learn something from Baden-Württemberg. For this region, the innovativeness of the local companies seems not to be the most pressing problem. Their R&D intensity is fairly high and the companies define innovativeness as their major advantage. Still, the region has the highest share of companies that reduced employment and turnover or even both. This could be seen as indicating that the region needs to expand into new industries with more growth potential in order to come to grips with the unemployment problem. Then the concept of an innovation system with close and exclusive ties may actually become a hindrance to economic growth and more employment.

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Endnotes

- ¹ In the following, I will not discuss the relationships between competitiveness and economic growth and social welfare, although I am aware of the fact that competitiveness is not an aim in itself but rather a means to achieve other aims.
- ² Here I do not deal with the institutional environment, which is part of a regional innovation system. Support organizations are included only through looking at the interaction of firms with support organizations.
- ³ As the intention was to have a representative sample of the region, the samples differ significantly concerning both firm size and industries. The concept of industrial districts assumes, however, that in successful regions the same kind of effective organization forms and institutional structure will develop independent of specific industrial structures (Pyke & Sengenberger 1992).

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- ⁴ Here I deal with regions as sub-national units.
- ⁵ This analysis would actually need a panel analysis, as the impact of innovations on employment and turnover in general occurs some times later after the innovation has been introduced.
- ⁶ Multiple answers possible.
- ⁷ Groups means for four-group K-means cluster solution*

Variable	Cluster			
	1. 'Innovators' (n=133)	2. 'Strong competitors' (n=234)	3. 'Weak competitors' (n=163)	4. 'Marketers' (n=205)
Price	2.41	4.22	1.66	3.65
	6	6	4	3
After-sales service	2.85	4.70	0.92	2.91
	5	4	5	5
Quality	5.09	5.47	3.66	5.13
	1	1	1	2
Time of delivery	4.01	5.17	1.73	5.20
	3	2	3	1
Technical standards/ innovativeness	4.83	4.82	2.40	3.53
	2	3	2	4
User-friendly products	3.92	4.57	0.37	0.40
	4	5	7	6
Ecological aspects	2.24	4.01	0.52	0.60
	7	7	6	7

* Numbers in bold indicate the highest group centroid for that variable. The rank order of importance of this competitive factor within the group.

- ⁸ To analyse global competitiveness, R&D-related indicators are quite often used. Here I use indicators that are related to the R&D budget and the R&D personnel. For both R&D budget and R&D personnel we constructed a static and a dynamic indicator. For the R&D budget I analyse how this has developed during the last five years (1990–1995). The static indicator measures R&D intensity; it compares companies' R&D budget with their turnover in 1995. Concerning R&D personnel, I also analyse how this has developed during the same period; the R&D intensity indicator compares the share of R&D personnel of the whole workforce in 1995.
- ⁹ A product as well as a process innovation may be new only to the company that has introduced it, or also new to the market. Of course, companies will announce fewer innovations new to the market than those only new to them

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- ¹⁰ We differentiate between companies with an increase of both turnover and employment, those that increased turnover but reduced employment, and companies that reduced both turnover and employment. Furthermore, we split the first group of companies counting separately those companies that had an increase in both turnover and employment of more than 50 per cent concerning both aspects. They can be defined as highly competitive firms.
- ¹¹ A high share of companies which have a workforce of more than 50 per cent unskilled workers is seen as indicating low structural competitiveness.
- ¹² By intra-organisational practices we mean group work, profit or cost centres, flat hierarchies, and inter-disciplinary design teams. Inter-organizational practices included inter-organizational networking, just-in-time delivery, outsourcing and system suppliers, and quality practices included total quality management, benchmarking and ISO 9000 ff.