The Economic Region of Central Franconia

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Introductory remark: This is the first draft of a case study written in context and according to the guidelines of the EU-financed Eurocap project (www.uni-bamberg.de/sowi/europastudien /eurocap.htm). This report focuses on Central Franconia. The second German case is the Leipzig region; therefore, many tables and figures refer to these two regions.

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1. Introduction

Central Franconia is, after the region of Munich (Oberbayern), the most prosperous Bavarian region and one of the ten strongest technology regions in Germany. This region, traditionally shaped by the electrical and mechanical engineering industry, is presently confronted with the challenge of transforming itself into a knowledge-based region. It is situated around the cities of Nuremberg, Erlangen and Fürth and has been relatively successful in facing this challenge; on the long road to an essential knot in international production, exchange and service networks essential steps were taken in the past years: The region was able to develop new scientific, technical, and economic competences in four different fields (transportation engineering and logistics, information and communication technology, medical technology and pharmaceuticals and electrical power engineering) as well as took the initial steps in the field of new materials. This was possible because, firstly numerous research and development capacities were set up in the above-named areas. Secondly the existing technical and organisational competences were updated in inter-company networks. Thirdly production-related services were developed as well as, fourthly new economic activities (for example in the area of consultancy and market research companies and in finance and IT service industries). This went alongside a renewal of former industrial strengths: Over the last ten years numerous traditional central Franconian firms have had to cut staff or even close down. Since the period 1992-1997, when a lot more jobs were lost than created and Nuremberg was even designated a crisis region (Dörre 1999), the number of employees obliged to pay social insurance contributions has considerably increased (even if numerous new firms had to downsize their staff during the last two years).

This far-reaching structural change went alongside a path-dependent development of new regional capabilities as discussed. Nonetheless these numbers show that the economic strength of the central Franconian economy is based on the complementary strengths of a competitive industrial sector and advanced services. The transformation of industrial enterprises to innovative, internationally organised firms increases the demand for production-related services.

In the following, first, the concept of regional capabilities will be introduced (2), then the historical, politico-administrative, and social construction of the central Franconian region will be explained (3), subsequently we will describe the renewal of the economic capabilities of the region (4) and we will then analyse the institutional conditions for the successful renewal of this traditional industrial region (5). We rely both upon generally-accessible

publications and statistics and on 16 interviews conducted from January to March 2004 with representatives from regional companies, trade unions, business associations, the regional Chamber of Commerce and Industry and different regional networks of competence designed to develop specific fields of activity. Nevertheless, important questions regarding the process, by which the Nuremberg region will be newly „fabricated“, cannot be fully answered yet. In conclusion, a summary of the findings will be given (6).

2. Regional capabilities: The theoretical approach

An economic region can be analysed as a societal field which is shaped by the regional companies, regional institutions and identities and individual actors.[1] The capabilities of a region are anchored in its organizational capabilities (in its companies, its industrial structure and its patterns of specialisation) and in its institutional structure.[2] These structures are the „memory" of a region, the result of path-dependent experiences of cooperation and conflict. These institutional structures have been described by Salais/Storper (1997) as regional orders, as *conventions*, as taken-for-granted mutually coherent expectations, routines, and practices". The institutions (or governance structures, conventions or regional orders) are produced or re-produced in an open, but path-dependent way a) by the transaction-cost-minimising network strategies of enterprises, b) by regional public authorities (especially in federal states) and c) by non-governmental actors (for example trade unions, professional and business associations, NGOs or sometimes even individual actors).[3] The regional governance structures are crucial for the innovative potential of regions and regional firms, because they are regulating the organizational patterns of work, management and innovation, and are shaping the interorganizational patterns of cooperation and competition and because they are regulating the relationships between businesses, science, technology, education and politics.

In the following, we will analyse the impact of companies, public authorities and associations on the governance structure of the region of Central Franconia. It can be assumed that these structures will have a major impact on the competitive strength of this region.

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1 „In their most generic guise, such fields are composed of (1) organizations seeking to structure their environments, (2) preexisting rules (i.e. existing institutions) that operate to constrain and enable actors in the arena, and (3) skilled strategic actors who work within organizations to help attain cooperation among disparate groups and interests". Fligstein/Stone Sweet 2002: 1211.

2 This refers to the concepts of regional innovation systems which have been defined ad follows: „Regional innovation system denotes regional clusters surrounded by `supporting` organisations. Basically, a regional innovation system consists of two main types of actors and the interaction between them (...). The first actors are the firms in the main industrial cluster in a region including their support industries. Secondly an institutional infrastructure must be present, i.e. research and higher education institutes, technology transfer agencies, vocational training organisations, business associations, finance institutions etc., which hold important competence to support regional innovation." (Asheim/Isaksen 2002:83) In contrast to the cluster concept – which has been defined as „geographically proximate firms in vertical and horizontal relationships involving a localised enterprise support infrastructure with a shared developmental vision for business growth, based on competition and cooperation in a specific market field" (Cooke 2002:121) – the relative importance of supporting institutional structures is estimated to be higher.

3 In an ideal-typical way, Cooke (1998) has opposed these different forms of coordination as grassroots, network and dirigiste structures of governance (Cooke 1998).

3. The boundaries of the „local system“, the „economic identity“, and the „local social identity“

Central Franconia is one of the seven Bavarian administrative districts (cf. figure 1). 1,693,650 people live in the region (2002), 13.8% of the Bavarian and 2.1% of the German population. In 2000 those in employment numbered 879,000, of which 643,949 made social insurance contributions. There were 7.7% unemployed (June 2003) – a figure clearly above the Bavarian average (6.4%) and below West and overall German levels (8.1% & 10.2%). The real net output per capita in the year 2000 amounted to 126.3% of the European average (EU15), thus being above the Bavarian (124.3%), German (106.4%) and Leipzig (75%) averages, but below the upper Bavarian average (154.4%). Central Franconia comprises two different planning regions: One is the rural area “West Central Franconia”, the other the “industrial region of Central Franconia”. The second region is the economic centre of Central Franconia: In this region, which occupies 40% of the surface of Central Franconia, 81% of the Central Franconian employees produce 82% of its economic output[4]. In the centre of the industrial region of Central Franconia are the four neighbouring towns of Nuremberg (491,991 inhabitants in the year 2002), Fürth (111,293), Erlangen (109,906) and Schwabach (38,535).

Figure 1: Central Franconia. One of seven Bavarian administrative regions

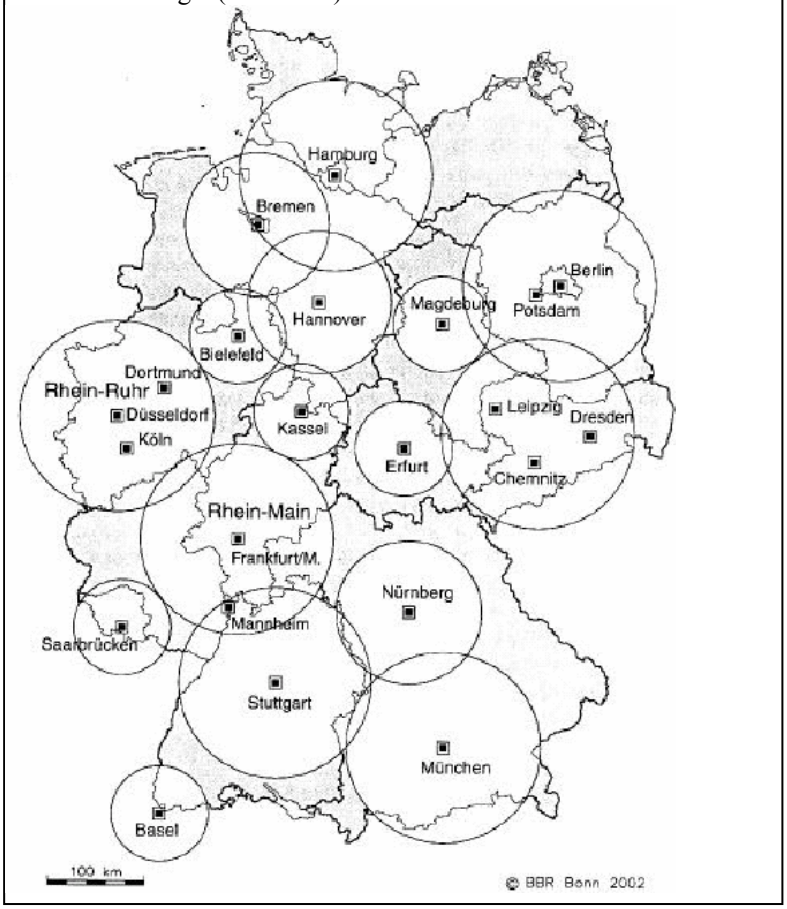
To a large extent the identity of the region is defined by the city of Nuremberg, mentioned in a document for the first time in 1050. In 1219 Nuremberg became a free imperial city; since then its history has been closely bound to the Holy Roman Empire of the German Nation. In 1356 it was laid down that newly-elected emperors would have to celebrate their first imperial assembly (“Reichstag”) in Nuremberg. Since 1424 the imperial Crown Jewels have been kept in the city; Nuremberg was termed „The Treasury of the German Reich“. The self-administration of taxes and freedom from customs duty in the free

4 Sources: European Commission, 2003: Second progress report on economic and social cohesion. Brussels, COM (2003) 34/4; IHK Nuremberg for Central Franconia, 2003: Economy in Central Franconia. Report 2002/03. Nuremberg (www.ihk-nuernberg.de/Beratung/Kommunikation/Jahresberichte/Jahresberichte.jsp)

city led to extra- ordinary economic prosperity during the 13th and 14th centuries. Nuremberg was able to profit from the revival of foreign trade at the end of the Middle Ages, as it lay on the foreign trade route between north Europe and upper Italy and between west and central Europe (Bohemia, Poland). Foreign trade and handicrafts prospered. Around 1500, in the age of renaissance and humanism, the city reached its cultural and economic peak; it became a European centre for handicrafts, art and culture. The denominational split in Germany during the course of the Reformation (which prevailed in Nuremberg in 1525), the 30-years war (1618-1648) and the alteration of trading routes associated with it led to the economic and cultural decline of the city. In 1806 Nuremberg was attached to the Kingdom of Bavaria. During the industrial revolution of the 19th century, Nuremberg was able to rekindle its old commercial and artisan tradition once more; a visible sign of this was the first German railway, which ran from Nuremberg to Fürth in 1835. The development of the machinery and electronics industries, the traditional toy and pencil production, and the bicycle and motor industries brought about an economic upswing. In 1933 the darkest chapter in the history of the city began: Nuremberg became the city of the Reich party congress. In the Second World War 90% of the old city was destroyed.

Figure 2: European metropolitain region in Germany

Source: Blotevogel (2002: 344).



However, the question concerning the existence of a regional identity cannot be answered satisfactorily by reference to a 600-year old tradition as an imperial city. Franconia itself was never a political entity, but comprised a large number of autonomous territories (imperial cities, bishoprics and margravates). From 1555 to 1806 these were loosely connected within the framework of the Franconian Imperial Region ("Reichskreis") (capital: Nuremberg). This polycentric political

structure is still conserved by the multiplicity of residential towns (alongside Nuremberg for example Erlangen, Bamberg, Würzburg, Ansbach and Bayreuth). Nuremberg has always rather been a focal knot in a supraregional communications, transport and trade network than the capital of a compact, relatively closed territory, like it is the case with Munich.

Even today, this is still the case: The Nuremberg metropolitan region is an important industrial and commercial knot in national and supra-national networks. With the enlargement of the European Union, Nuremberg may become once again a „gateway“ between east, central and western Europe (Frommer 2003: 7 and Figure 2).

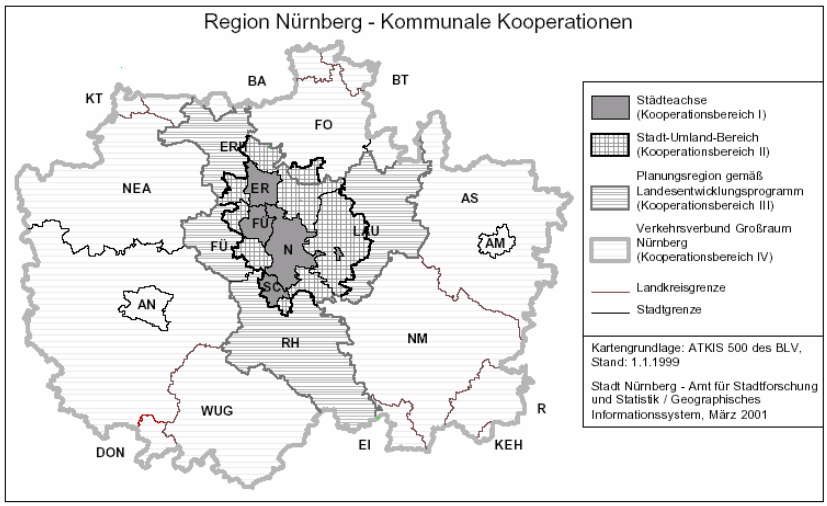
If a region is defined as „a territorially demarcated area below the level of a state, which exhibits a `certain independent organisation´ and serves as an object of identification for its inhabitants“ (Frommer/Bomba 2003:12), then first and foremost the question of the political organisation of the central Franconian area must be answered. In this respect attention should be drawn to the existence of an administrative district (“Regierungsbezirk”) of Central Franconia and a district Central Franconia (“Bezirk”). In Germany, administrative districts are the middle state administrative level between a federal state and a rural district or towns which on their own constitute an administrative unit. At the same time, in Central Franconia there exists a territorially identical district. A district is the third level of communal self-administration (above local authorities and rural districts/towns). Further institutions and organisations likewise cover the central Franconian region or large parts of it – for example the Nuremberg Chamber of Commerce and Industry and the chamber of crafts, the regional savings bank organisation, the regional natural gas and power supplier, the public transport system and the marketing association „The Nuremberg Region“. These institutions and businesses also partly cover other areas – particularly the upper Franconian rural district of Forchheim, which is closely linked to Nuremberg/Erlangen.

A further organisation central to the identity of the region is the Friedrich-Alexander-University of Nuremberg-Erlangen. Approximately 80% of its 22,000 students heritage from the Franconian area. The university plays a central role for the region – both as a hidden local “technical university“and by providing medical support to the region and cooperation with the local economy, where medical technology plays an outstanding part. 54% of the approximately 12,000 employees of the university work in the medical faculty and in clinics.

From an economic, political, and social point of view Central Franconia can therefore certainly be regarded as a relatively clearly demarcated economic region with an own identity – even if the cities of Nuremberg, Erlangen and Fürth are located in the centre of the region and different forms of agglomeration can be distinguished within Central Franconia. Frommer

(2003) proposes to distinguish four distinct „Nuremberg regions“ according to different agglomeration intensities (cf. Figure 3 within Central Franconia the first level comprises): the four towns of Nuremberg, Erlangen, Fürth and Schwabach, whose local governments are closely cooperating. Further regions are, the four towns and their surrounding communities, the planning region „Central Franconian Industrial Region“, and finally the administrative district of Central Franconia – extended by neighbouring districts and towns such as Forchheim, Neumarkt, Amberg, Amberg-Sulzbach.

Figure 3: Nuremberg in its regional context



Source: Frommer (2003: 1).

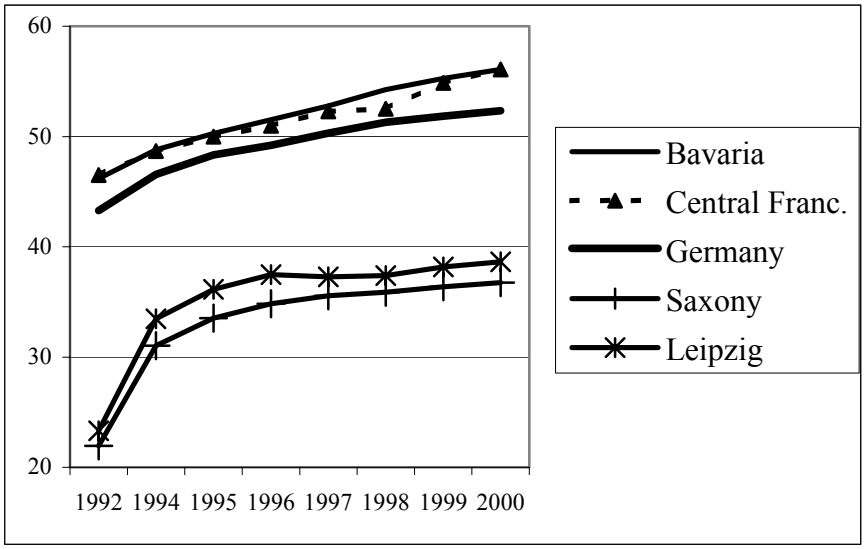
4. The industrial and economic structure of the region

4.1 Facts and Figures

Until the 1960s, Bavaria was still a largely agrarian state, whilst its capital Munich was rather a centre of the courtly and cultural life than an industrial site. This does not apply to Central Franconia. With reference to trading traditions of the Middle Ages, an efficient metal and electrical industry had already been developed in the region during the 19th century. Today the economy of Central Franconia is still largely dominated by the industrial sector: With 150 employees in manufacturing occupations per 1,000 inhabitants, industry in Central Franconia is clearly stronger than in Bavaria (143) and Western Germany (123), whilst the number of those employed in the service sector - 149 – is considerably below the Bavarian (215) and west German (214) level (Figures for 2001; Source : Bavarian State Ministry for Economy, Trade and Technology, 2003).

Up to the beginning of the 1990s the economic output per employee was above the Bavarian average (cf. Figure 4). In the middle of the 90s it fell below this level, only to reach the Bavarian level again in 2000.

Figure 4: Gross domestic product in Central Franconia and Leipzig (1000 EUR per employee; 1992 to 2000; at current prices)



Source: Federal Statistical Office, 2002: Data base „Statistik regional“.

When it comes to employees and output, the most important branches in Central Franconia are the electrical and electronics industry, mechanical engineering and the automobile

industry. Electrical and mechanical engineering carry far more weight in Central Franconia than they do in Germany as a whole. The medical technology industry based in Erlangen and the automotive industry are also important employment areas, whilst the once significant entertainment electronics sector will continue to lose importance following the bankruptcy of Grundig in 2003 (1979: 38,000 employees) (cf. Table 1).

Table 1: Employment weight of different industries (in absolute numbers and in % of industrial employment; 1995, 2002)

Economic Branch; Firms with 20+ employees	**Cent. Franconia 1995**	**Central Franconia (2002)**		**Bavaria (2002)**		**Germany (2002)**	
Appliances used in generation & supply etc. of electricity	38,875	33,535	18.7%	106,846	9.0%	424,941	6.8%
Thereof electricity supply and switching installations		*20,681*	*11.6%*	*55,779*	*4.7%*	*196,597*	*3.2%*
machinery and equipment	34,051	30,187	16.9%	195,057	16.4%	970,804	15.6%
transport equipment	7,199	12,208	6.8%	175,567	14.8%	790,224	12.7%
food products; beverages and tobacco	11,251	11,923	6.7%	93,398	7.9%	530,832	8.5%
Furniture, jewellery, musical instruments, sports appliances	13,741	11,432	6.4%	46,694	3.9%	205,273	3.3%
Toys		*2,921*	*1.6%*	*5,549*	*0.5%*	*13,146*	*0.2%*
Metal products	12,513	10,757	6.0%	73,022	6.2%	578,331	9.3%
Medical, precision instrument, tax and automatic control technology, optics	13,658	10,569	5.9%	47,175	4.0%	232,802	3.7%
Thereof medical appliances & orthopaedic equipment		*5,645*	*3.2%*	*15,812*	*1.3%*	*84,235*	*1.4%*
Optical & photographic appliances		*1,044*	*0.6%*	-		*30,230*	*0.5%*
Rubber & plastic goods	11,361	10,511	5.9%	66,469	5.6%	350,530	5.6%
Radio, television and information technology	12,601	8,032	4.5%	53,246	4.5%	170,962	2.8%
publishing and printing	9,947	7,993	4.5%	52,195	4.4%	259,995	4.2%
Metal production & treatment	8,133	7,087	4.0%	24,151	2.0%	261,807	4.2%
Chemical industry	6,179	7,081	4.0%	60,709	5.1%	461,713	7.4%
Glass industry, ceramics, processing of stones & earth	6,932	5,251	2.9%	55,470	4.7%	220,760	3.6%
Leather industry	2,307	3,100	1.7%	6,640	0.6%	23,503	0.4%
Paper industry	3,171	2,827	1.6%	21,210	1.8%	142,255	2.3%
Other motor construction	4,133	2,241	1.3%	31,490	2.7%	148,071	2.4%
Timber industry (excl. furniture)	2,500	1,700	1.0%	17,086	1.4%	96,335	1.6%
Textile industry	2,009	1,092	0.6%	21,043	1.8%	110,332	1.8%
Clothing industry	1,507	632	0.4%	16,923	1.4%	53,901	0.9%
Mining & stone and earth extraction	481	513	0.3%	7,087	0.6%	100,051	1.6%
Industry (total)	203,152	178,920	100.0%	1,186,283	100.0%	6,208,685	100.0%

Source: IHK (2003) and Federal Statistical Office, 2002: Data base „Statistik regional“.

Table 2: Employees classified according to size of firms in the manufacturing industries, in mining and quarrying (2000)

Size of firm	**Germany**	**Bavaria**	**Central Franconia**	**Saxony**	**Leipzig**
under 50 employees	10.7%	0.9%	8.7%	19.9%	22.1%
50 - 99 employees	11.7%	9.8%	9.2%	19.6%	20.4%
100 - 199 employees	14.1%	12.7%	10.8%	21.5%	24.9%
200 - 499 employees	21.0%	19.9%	18.3%	21.0%	22.8%
500 - 999 employees	13.6%	14.8%	16.2%	10.1%	9.9%
1000 or more employees	28.9%	34.1%	36.9%	8.0%	0.0%
Total (100 %)	6,431,966	1,222,331	185,639	222,357	38,984

Source: Federal Statistical Office, 2002: Data base „Statistik regional“.

In respect to the enterprise size, the central Franconian industry is dominated by larger enterprises. More than a third of the regional labour force is employed in enterprises with more that 1,000 employees – much more than in Bavaria or Germany (cf. Tables 2 & 3).

Table 3: The largest employers in Central Franconia (2003)

Name of Firm	Headquarters	Employees in C. Franconia	Employees Germany	Employees worldwide
1. SIEMENS	Berlin / Munich	32,600	171,000	417,000
2. KarstadtQuelle	Essen / Fürth	12,000	110,000	120,000
3. INA Schaeffler	Herzogenaurach	8,800	28,000	54,000
4. Sparkassen-Bezirksverband Mittelfranken	Central Franconia	7,570	282,000	282,000
5. Deutsche Bahn	Berlin	6,500	230,000	265,000
6. Deutsche Post	Bonn	5,000	240,000	320,000
7. Robert Bosch	Stuttgart	4,800	103,000	226,000
8. Datev	Nuremberg	4,704	5,410	5,410
9. Nürnberger Versicherungsgruppe	Nuremberg	4,355	32,436	34,622
10. Deutsche Telekom	Bonn	4,000	177,823	255,969
11. AEG Hausgeräte	Nuremberg	3,839	4,581	4,581
12. Genossenschaftsbanken in Mittelfranken	Central Franconia	3,416	167,200	167,200
13. MAN Nutzfahrzeuge	München	3,278	25,719	38,706
14. Diehl Stiftung und Co.	Nuremberg	3,250	8,800	10,600
15. N-ERGIE Aktiengesellschaft	Nuremberg	2,863	2,863	2,863
16. Bayerische Hypo- und Vereinsbank	Munich	2,660	31,361	65,526
17. adidas-Salomon	Herzogenaurach	2,080	2,150	13,160
18. Schwan-Stabilo	Heroldsberg	2,045	2,061	2,877
19. Verkehrsaktiengesellschaft Nürnberg	Nuremberg	2,028	2,028	2,028
20. Framatome	Paris	1,620	3,000	14,000
21. Verlag Nürnberger Presse GmbH & Co.	Nuremberg	1,540	1,550	1,550
22. GRUNDIG AG	Nuremberg	1,500	1,371	4,070
23. Lucent Technologies Network Systems	Murray Hill, USA	1,400	1,600	33,000
24. maul + co – Chr. Belser	Nuremberg	1,340	1,340	1,340
25. Staedler Mars GmbH & Co. KG	Nuremberg	1,300	1,600	3,100

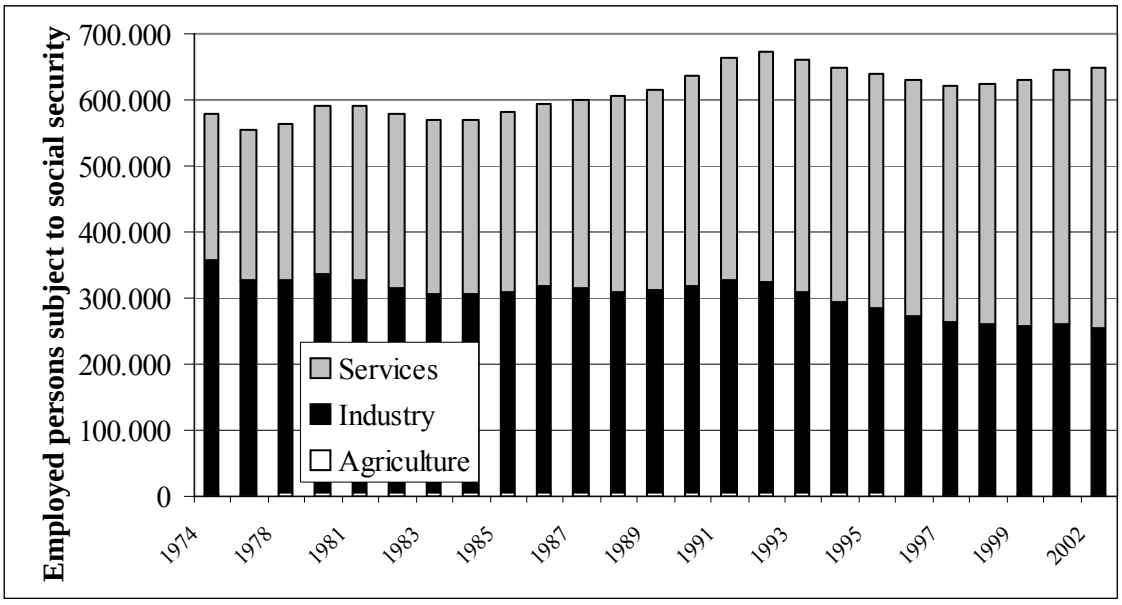
Source: IHK (2003).

The largest firms in the region are listed in Table 3. Alongside Siemens (13% of the regional industrial employment), a significant number of service firms - for example financial service providers (Sparkasse, Datev, Nürnberger, Cooperatives, Hypovereinsbank) and distribution and logistics enterprises (Quelle, Bahn, Post) are situated in the region. This list shows to what extent the regional economy depends on the decisions of external multinational companies.

Since the 1970s the region of Central Franconia has undergone a rapid de-industrialisation and tertiarisation process. The number of industrial employees paying social security contributions has fallen in the last decades from 352,695 (1974) to 250,122 (2002).

Meanwhile, the number of employees in the service industry sector has risen from 221,136 to 393,392. Therefore, the percentage of industrial workers has fallen from 61% to 38.6%, whilst the percentage of the service sector employment has risen from 38.3% to 60.7% (cf. Figure 5). Over 170,000 new jobs have been created in the service sector, whilst over 100,000 jobs have been lost in industry (amongst these in such well-known firms as Grundig, Triumph Adler, AEG, Adtranz, Cebal, ABB/ALSTROM).

Figure 5: Employed persons subject to social security (Central Franconia; 1974-2002)



Overall, Central Franconia has accomplished the transformation from an industrial region to a knowledge-based region mainly on two different paths: On the one hand, the service sector – especially production-related services – have been expanded, on the other hand, the innovativeness and competitiveness of industrial firms in the region has been considerably strengthened.

The strong position of the central Franconian economy in business services is documented in tables 4 & 5. The employment share of business-related services is higher in Central Franconia than in Bavaria and Germany. This is true in relation to the total labour force (cf. Table 4) as well as to the employees obliged to pay social security contributions (cf. Table 5). In Central Franconia there are approximately 30,000 employed in consultancy, advertising and market research firms, 30,000 in financial services, 15,000 in IT and telecommunications firms and 10,000 in engineering offices and advisory bureaux (Source: www.ihk-nuernberg.de). Further, Call centres are an important field of employment. To enforce this, the Bavarian Ministry of Economic Affairs, Infrastructure, Transport and

Technology founded the "Communication Centre Academy" based in Nuremberg and with training posts all over Bavaria. A lot of money was invested in this sector over the years and Bavaria as a whole and Nuremberg in special developed into a highly competent call centre location. Many companies like Siemens, Quelle, DATEV, Allianz, AEG, Profectis, Elektrolux, defacto teleservices, etc. have call centres in Nuremberg and its environs, so that approximately 10,000 people are employed in about 50 call centres in the region. (Source: Stadt Nürnberg) It was clear from the beginning that this sector would not last longer than ten years (Interview 4: 6) and it seems like the rapid growth of the sector has come to an end. Now the apprehension of the city is that many call centres could be transferred to Eastern Europe where cost of labour is lower.

Nonetheless, these numbers show that the economic strength of the central Franconian economy is based on the complementary strengths of a competitive industrial sector and advanced services. The transformation of industrial enterprises to innovative, internationally organised firms increases the demand for production-related services.

Table 4: Employees in different branches of the economy (2000)

	Germany	**Bavaria**	**Central Franconia**	**Saxony**	**Leipzig**
Agriculture, forestry and fisheries	2.5%	3.7%	2.8%	2.8%	2.3%
Production industries	29.2%	31.6%	31.3%	31.1%	26.2%
- Manufacturing industry	20.9%	24.4%	25.3%	16.5%	11.6%
Service industries	68.4%	64.7%	65.9%	66.2%	71.5%
• Wholesale and retail, hotel and restaurants and transport	25.4%	24.9%	25.0%	23.3%	24.0%
• Financial intermediation (J) Real estate and business activities	14.8%	14.4%	16.8%	13.7%	17.2%
• Public and private services	28.2 %	25.4%	24.0%	29.2%	30.4%
Total number of employees (in 1000; = 100%)	38.706,0	6.240,50	879	1970	492

Source: Federal Statistical Office, 2002: Data base „Statistik regional".

Table 5: Employed persons subject to social security at place of work (6/2000)

	Federal Republic of Germany	**Bavaria**	**Administrative District of Central Franconia**	**Saxony**	**Leipzig, Administrative District**
Agriculture, forestry & fisheries (A, B)	0.1%	0.8%	0.7%	2.6%	2.1%
Mining (C)	0.5%	0.3%	0.3%	0.0%	0.4%
Manufacturing (D)	26.1%	31.5%	31.7%	18.4%	13.1%
Energy and water supply (E)	1.0%	0.9%	1.6%	1.3%	1.6%
Building trades (F)	8.0%	7.5%	6.1%	12.9%	13.8%
Wholesale and retail (G)	15.2%	15.3%	15.5%	13.2%	13.9%
Hotels and restaurants (H)	2.8%	3.2%	2.4%	0.3%	0.3%
Transport and communications (I)	5.4%	4.5%	5.1%	5.9%	0.7%
Financial intermediation (J)	3.8%	4.3%	0.4%	2.5%	3.5%
Real estate and business activities (K)	10.6%	9.8%	11.9%	10.1%	12.5%
Public administration, defence, extraterritorial organisations and bodies (L, Q)	6.4%	5.1%	4.8%	7.7%	7.3%
Education, health and social work, community, social and personal services (M, N, O, P)	18.7%	16.6%	15.7%	22.2%	22.5%
Total (inc. no answers; corresponds to 100%)	27,825,624	4,36,.659	643,949	1,526,531	382,723

Source: Federal Statistical Office, 2002: Data base „Statistik regional“.

4.2 The Cluster Approach

In a spatial dimension, the complementarities of industry and services are a major reason for the development of regional clusters: “A cluster is a geographical concentration of businesses and institutions connected to each other within a certain branch of the economy. It includes a number of networked branches and other organisational units relevant to competition. These include, for example, the distributors of special materials such as components, machinery and services as well as suppliers of specialised infrastructure“ (Porter 1999; translated from the German). A crucial feature of the regional economic policy of Central Franconia is the reinforcement of the regional capabilities by cluster policies (cf. Boekholt/Thuriaux 1999).

However, the cluster policies in Central Franconia were not developed before the mid 90s, when the region was facing a major structural crisis. Old and established industrial companies like Grundig, Adtranz, AEG etc. had to downsize massively or even close plants due to either the rise of productivity or due to the overall change in production industry worldwide.

As early as 1993 the IG Metall made the suggestion to develop competence fields in environment, energy and transportation. This was not supported by other regional actors though. At that time the CCI promoted the aspect of liberalism and hands off politics. This

only changed when the chamber changed its management and started to realise that structural policy in the region can be an advantage. However, it was not until the late 90s when Central Franconia was in a severe structural crisis, that the regional actors joined forces and developed a regional development guideline (or vision) as well as accompanying initiatives.

This measure to support and develop the different branches of the regional industry was finally designed in 1998, after the trade unions had tried to establish a joint regional collaboration for years. The Chamber of Commerce and Industry (CCI) worked in close cooperation with the unions, the city governments, the rural districts and the Chamber of Handicraft. The capabilities of the region were identified in five different fields: (1) Medicine-pharmaceutics-health, (2) energy and environment, (3) transport and logistics, (4) communications and multimedia and (5) new materials. There were two conditions the five competences had to fulfil (Interview 12: 4). Firstly they had to be of above-average importance for the region. Secondly they had to be in a seminal and future oriented industrial field.

In 2000 the Bavarian Land government started its High-Tech-Offensive which used DM 8.25 billion from privatisation revenues to give the economy lasting investments and innovations and to improve the competitiveness of the Bavarian economy. The money was invested in projects furthering the research, technology and education of a region as well as for start-up initiatives, and measures to open up new markets (Source: Bayerisches Staatsministerium für Wirtschaft , Verkehr und Technologie). In order to get funding the regional actors had to produce appropriate projects. Within the five different areas of competence altogether 70 projects where were funded with DM 750 million. from the Bavarian-High-Tech-Offensive.

The guideline and the funding that went with it had the goal to form a strategic overall concept to turn the economic region of Nuremberg into an international top region and to secure added value, income and jobs in the region (Source: IHK Entwicklungsleitbild).

During the development of the guideline, the important companies situated in the region were asked for their input and their know-how was taken into account as the five clusters were phrased. However, they were not actively involved in the decision-making process. Although the CCI wanted to involve all relevant regional actors in the design of the guideline, with leaving out the companies (and the scientific institutions), they did not fully include a number of crucial regional factors. Earlier attempts to develop fields of competence

failed exactly due to the reason that not all the relevant actors were included in the project[5]. This time though, although the companies and scientific institutions did not take part in the decision-making process, all of the other regional players were included. The positive aspect of this is that after the capabilities were agreed upon none of these public institutions were making attempts to block the guideline and the measures connected to it. In addition, as we will see further on in the text, the companies and the scientific institutions are at least not completely opposed to the idea of regional competences and networks, since many of them are members of appropriate initiatives and support them.

On the basis of the development guideline the agreed capabilities were to be promoted through so called networks of competence. It is their task to provide an institutional platform for companies (and scientific institutions) to interact with each other. They are destined to help develop networks within a competence, establish contacts between different companies or between companies and scientific institutions, to generate pilot schemes, and altogether to enable the competence field to thrive and grow. (cf. also www.kompetenznetze.de).

Before analysing these clusters in detail, one fact has to be mentioned which is important for all the regional clusters. The region and its profile as an innovative technological region cannot be analysed without taking into account the different divisions of Siemens (cf. Table 3). With around 33,000 employees (2003) Siemens is by far the most important employer in the region (22,000 work in Erlangen, 9,000 in Nuremberg and 2,500 in Fürth). According to a Siemens spokesman, further 100,000 employees depend directly or indirectly (supplier relations, services etc.) on the company. Five of the 13 divisions of the company are controlled from Erlangen: Industrial Solution and Services (I&S), Medical Solutions (Med), Power Generation (PG), Power Transmission and Distribution (PTD) and Transportation Systems (TS). Two other divisions are controlled from Nuremberg: Automation and Drives (A&D) and Siemens Dematic (SD). Beside the seven division headquarters, additionally there are five plants in the region employing about 8,000 to 9,000 people (Interview 16). Therefore, the regional cluster structure in Central Franconia cannot be analysed without taking into account the central role of Siemens. This of course does not mean that Siemens is the focal enterprise in all clusters: In the area of medical and energy technology the importance of Siemens is clearly much greater than in environmental technology. And although Siemens is among the largest employers in the region, it is

[5] The ZATU e.V. (Zentrum Arbeit Technik Umwelt) initiated by the IG Metall did not have the desired success, since it was only the trade union involved in the design and the implementation of the concept.

important not to underestimate the importance of the very well developed structure of small and medium sized enterprises in most of the five different competence fields.

In the following sections the five clusters are going to be portrayed, their future development chances and the challenges the regional actors are facing are going to be examined.

4.2.1 Medical Technology

The competences of the first-named cluster, i.e. in ***Medical Technology***, are concentrated in the Erlangen area. The central actors are the Medical Faculty, the 21 university hospitals, the Siemens Medical Solutions division and approximately 700 small and medium sized businesses in the medical and pharmaceutical area. It is estimated that approximately 70,000 people work in that field. For Central Franconia as a total this means that about 10% of the employees who are subject to social security are employed in the medical sector. In Erlangen this number is with over 20% even higher.

The competence in this field already commenced in the 19th century when the company Reiniger, Gebbert & Schall was founded. It soon became a leading producer of x-ray machinery and equipment. When Siemens (then still called Siemens & Halske) bought the company in the mid 1920's, the field continued to develop covering the whole range of electro medical fabrication (Source: Feldenkirchen, 2003, p.230 et seqq.). With the Medical Faculty of the Friedrich-Alexander-University already being a very important research and teaching centre and the growing importance of the electrometrical division of Siemens, a number of smaller companies developed in the field over the past century.

Today, Medical Technology is without question one of the most important competence fields in the region. In order to further and promote this field a network of competence was established in 1997 (Kompetenz-Initiative-Medizin-Pharma-Gesundheit e.V.) Meanwhile there are approximately 100 active members, of which half are company representatives and half are representatives of the cities, the chambers, and the scientific institutions. The main task of the initiative is to establish a well functioning network between the companies themselves as well as between the companies and the different kinds of regional institutions. This is done (as in the network initiatives of the other fields as well) through member meetings or series of lectures about specific topics. According to the managerial head of the initiative, especially the smaller companies often do not see the necessity for cooperation. Usually it is not until they are facing a major economic crisis that they realise its importance

(Interview 2: 7). Nevertheless, especially in the medical field cooperation between the companies and the scientific institutions is comparatively intense. In a few cases, firms are even spin off's of one of the Fraunhofer Institutes, the Universities, or Siemens. This usually results in intense connections with these institutions.

Since 1996 the city of Erlangen is focussing on the task to establish Erlangen as a "Medical Valley". One of the prestige projects of the city and the Bavarian government is the Innovation Centre for Medicine and Pharmaceutics (IZMP), which functions as an incubator for companies in the medical sector, as well as accommodating the University Institute for Medical Engineering. In context of the High Tech Offensive the Land government invested 11 million Euro in the Centre which was built on former Siemens premise. Additionally, many start-ups emerged due to the activities of the Land government and the city. In some of these cases they have become very successful, such as the prominent example of HumanOptics, winner of the Businessplan Competition in 1999, and WaveLight-Laser-Technologie, which was awarded the Bavarian Innovation Prize in 2000 and which won the German Startup Competition in 2002.

Medical technology seems to be one of the strongest and most seminal competences of the region. It holds many jobs, the quality of the research facilities is globally acknowledged and it is a thriving industry sector with many innovative start-up companies. The only danger in this field is its dependence on the goodwill of one company – namely Siemens Medical Solutions. If Siemens Medical Solutions should ever decide to leave the scene (right now it does not look like it), it is questionable how much longer Erlangen could call itself "Medical Valley". Most of the smaller companies depend in one way or the other on Siemens, making them vulnerable to its location decisions.

4.2.2 Communications and Multimedia

In the field of ***Communications and Multimedia*** both, the IT-sector (hardware, terminals and distribution), as well as the print sector (printing and publishing) have each about 20,000 employees. Advertising/Journalism/Market Research (16,000), Audio vision/Multimedia (11,000), the Data-/IT-Services and Consulting (15,000) as well as the software branch (5,000) are also part of this cluster. Altogether around 87,000 people work in that cluster and it employs the most wage earners in the region. The Nuremberg region belongs to the eight most important Information and Communication locations in Europe (Source: Financial Times Deutschland, 17.07.2001), and represents in Bavaria a "good number two after

Munich" (Interview 7: 1) It has a long engineering history, going back to industrialisation and continuing with companies like AEG, Grundig, Siemens etc.. Even today Nuremberg has the highest density of engineers in Germany (Source: CCI). Network, network access, and digital transmission technology are an important regional field of competence due to renowned research institutes such as the Fraunhofer Institute for Integrated Circuits, the Fraunhofer Institute, Heinrich-Hertz-Institute for Communications Engineering, the corresponding departments of the Erlangen-Nuremberg University, the Max-Planck-Research Group for Optics, Information and Photonics, which is part of the University and the specialised institutes of the University of Applied Sciences "Georg-Simon-Ohm" in Nuremberg. The scientific know-how is complemented by the development and production capacities of internationally-active companies such as Lucent Technologies or Siemens. In addition, countless specialists for the development of new transmission links are working in the region. This value-added chain is completed by end-users as for example DATEV, Quelle, or the Consumer Research Society (GfK). (Source: www.wirtschaft.nuernberg.de/ ver2003/high tech_standort/info_komm; accessed 2/11/2003).

Some of the most prestigious products and projects are for example the development of the mp3 standard by the Fraunhofer Institute for Integrated Circuits, optical transmission techniques, or UMTS Networks and Applications developed by both Lucent and the Fraunhofer Institute. Additionally, there is work done in the field of E-government and security solutions for computers. It is also important to mention that the region has a vast number of open source specialists. Furthermore, one of the biggest Linux companies, SuSE, is based in Nuremberg.

Also in this field a network of competence has been established, the "Nuremberg Initiative for the Communication Industry" (NIK) in 1994, well before the global IT-hype and the regional development guideline. The goal of the initiative was to position the region nationally and internationally in this field as well as to work out government supported projects for the region. Additionally, the interlinking of the companies and scientific institutions has always been a goal of the network. Today, the initiative has 87 members and sees itself as an industry sector association. Networking is done by arranging lectures and discussions concerning special topics (like digital signature, mobile technology, E-Government etc.) or member meetings. The development of the initiative has undergone a specialization. It started out to be a general Communication and Multimedia platform, but positioned itself according to the regional industry structure including Linux, mobile technology, E-Government, Laser technology etc.

In sum, the Communications and Multimedia cluster is a very important field in this region, even if not as obviously and internationally acknowledged as Medical Technology, it nevertheless employs the highest share of people in the area and some important companies like Lucent, SuSE or Siemens are situated here. Especially in this sector innovative start-up companies are very important, since they are an engine for further development.

However, similar to other fields, the sector needs to stay competitive compared to other locations. It is likely that, for example, software services or production can be transferred to low cost countries like India or China. Siemens has already announced a movement in this direction. It is not unlikely that other companies will similarly reconsider their location decisions. Therefore, the regional institutions will have to consider their regional strengths and capabilities in order to position themselves in the global market and keep investments in the area.

4.2.3 Energy and Environmental Technology

Approximately 50,000 people in around 500 companies are employed in the ***Energy*** sector. Power electronics alone has 300 companies, which is 37% of the Bavarian branch share. Altogether 33,500 are employed in the production of equipment for the generation and distribution of electricity and 15,000 in the turbine and power station construction and the corresponding services. The sector generates around one third of the regional turnover, has an export quota of around 40% and, according to a spokesman of the city council, the supply and the value chain are relatively deep in this region. In the area of ***Environmental technology*** there are about 700 small and medium sized firms with approximately 18,000 employees. The companies mainly focus on the waste industry, environmental management, and production integrated environment protection.

The regional actors did not start to focus on the issue of energy until the end of the 1990s. Only with the privatisation of the big energy companies the sector started to become interesting. Privatisation as well as the need to adapt to a global competition led to a need to cut costs and thus in many cases to downsizing of the companies. On this account the trade unions were naturally very anxious to keep jobs in that industry. As in the context of the "Employment Pact Bavaria"[6], the Land government had an interest to keep the unions friendly, it was a political decision to further and promote this branch of industry. Although

[6] A programme designed by the Land government in cooperation with the trade unions to cut unemployment drastically.

the region employs many people in that field and harbours a few fairly important companies like Siemens PG (power generation, the former KWU) and Siemens PTD (Power Transmission and Distribution), Semikron, N-ergie, e.on Bayern or Baumüller, it is not sure whether this branch will be able to assert itself in the region. Similar to other branches, the global competition is severe. Additionally, many (especially big) companies follow the market. Considering that the export volume of the branch is over 40%, the market is clearly not national. Only to name one example, the Siemens Power Generation division has only a few customers in Germany (Interview 16).

To face the challenges and help the area to stay competitive the regional actors took a number of measures. A competence network named "EnergyRegion Nuremberg." has been established in 2001 in order to function as a communication and coordination platform for companies and research facilities, having the same tasks as the other network organisations in the region. The initiative has 50 members and according to the managerial head of the initiative it is quite difficult to establish a functioning communication between the individual companies, indicating that a branch network has not established itself yet. The competence network is situated in a complex of buildings called the "Energy Technological Centre" (Energie-Technologisches Zentrum – etz), which is a technically specialised centre for the settlement of innovative companies and scientific institutions as well as the implementation of innovative projects in the energy sector. Already a number of start-up companies, scientific institutions, and networking organisations have moved in. The main task of the centre is to help its tenants with project promotion, order acquisition, and the expansion of national and international networks.

In order to stand global competition the focus of the regional promotion is going towards research and development in the field of renewable decentralised energy (Interview 8). One of the goals of the "EnergieRegion Nuremberg" is the promotion of structural change in the direction of sustainable economy, climate protection and the protection of resources.

4.2.4 Transport and Logistics

Approximately 75,000 people work in roughly 770 ***Transport and Logistics*** companies. This makes up around 19% of the employees who are subject to social security in the region. Until a few years ago, the main competence of the regional transport and logistics companies was railway transportation, but the withdrawal of the largest company Bombardier (former ADtranz) and other firms as well meant that the cluster had to leave the railway topic. Except

for Siemens TS, which still produces in the region because of its highly qualified production technique (e.g. for the Maglev system “Transrapid” or the driverless metro), focal companies are missing in that field today.

Since the sub area of railway transportation is not as pronounced as it used to be, the region has to focus on other competences as well. Some of the most important sub areas are drive engineering (Siemens AD), logistics (Dachser) and subcontractors to the automotive industry (Bing Power Systems, Federal-Mogul, MAN etc). The last named sub area is probably the most important one at the moment, employing the most people in the transportation industry. „Central Franconia as a traditional centre of electrical engineering and electronics profits from automobile supply, amongst others, as the amount of electronics in the added value of cars constantly increases“ (IHK 2003:10). The only drawback here is that no car production actually takes place in the region. The competences of this field are interconnected in the Nuremberg based technology transfer agency BAIKA – in which 1450 mainly Bavarian supplier companies are participating.

The other important sub area of the cluster is logistics. In the past years, the fraction of companies providing logistics services grew steadily to reach 37% of the companies in the field, employing approximately 40,000 people.

As in the other fields of competence a network of competence was established in 1996 to strengthen the field and to give it a distinct profile. The CNA “Neuer Adler” has 85 members of which 65 are companies and 20 are institutions. Additionally it has over 310 competence partners. The initiative is meant to add to the fortification and further development of the regionally available competences and innovation skills in the transport and logistics sector. Similar to other initiatives, it is designed to increase networking. An outbound marketing is supposed to take place and projects are initiated from this position. Characteristic to this initiative is the close cooperation with actors outside the region to compensate for missing regional competences, e.g. in the field of research. Since, according to the managerial head of the initiative, there is no focal point at the regional universities, the initiative works together with the networking initiative in Braunschweig, where the research facilities are more pronounced then in Central Franconia. The initiative engages in projects concerning intelligent transportation systems, drive engineering, logistics and vehicle electronics. One of the current projects is, for example, a project for the advancement of traffic guidance in congested urban areas, which is conducted in cooperation with the DLR Institute for traffic research in Berlin, Siemens, ADAC, the Nuremberg taxi head office and other actors.

According to the managerial head of the initiative, services (logistics) and processed production technique have the highest chances to stay competitive. According to a spokesman of the CCI though, the greatest risk concerning the success of these fields lies in the stronger competition as a result of the EU enlargement. Even now the local carrier companies have reallocated their storages on the much cheaper other side of the border.

4.2.5 New Materials

In 2001 a competence centre for ***New Materials*** has been opened in Fürth. Whether this centre will lead to the advancement of regional competences in this field cannot be assessed at present. This is the only new focal capability, without a long established tradition and large companies. Right now research activities are done at the Friedrich-Alexander-University, the Universities of Applied Sciences in Nuremberg and Ansbach, the Fraunhofer task force "Ultrafeinfocus-Röntgenzentrum" and the New Materials Ltd. in Fürth.

Especially the trade union IG Metall is interested in the promotion of this field, since it does not only include the development of new materials, but also the processing and production of these materials. Therefore, the trade union pleads for the renaming of the competence field into "Materials, Production- and System-Technology (Mechatronics)", to make it clear – especially for the companies supposed be active in the network to come – what kind of activity the field embraces. In sum, however, it is not clear yet how the branch will develop in the future.

Since the beginning of the 90s cross-linkage between the regional actors has been actively enforced. The individual municipalities and other regional actors work closely together and despite some sectoral egoism and some parish-pump politics, the cooperation within the region is exemplary. The governmental aid has mostly been invested in future orientated projects or at least in projects saving or creating jobs in the region, so it was possible to further and develop regional competences. Through this concentration of means it was further possible to reach a certain distinctiveness of the individual branches (especially medical technology and Communications/Media). As it could be seen on the previous pages, the region does face problems in the individual branches (e.g. especially smaller companies do not cooperate as much as wished for, certain parts of the University seem to be slow as well, when it comes to cooperation with the economy), but altogether the will to cooperate – from the side of the municipalities, the chambers, the unions, the universities, and the companies -

seems to be very strong in the region. Companies with good ideas and projects do not seem to have many difficulties finding the right contact person with the city, the CCI or the individual networks of competences in order to get help with their venture[7].

In conclusion: In the last decades the Nuremberg industrial region has fundamentally redefined and updated its technological and economic capabilities. Approximately 100,000 industrial jobs have been cut or relocated, whilst at the same time 170,000 jobs have been created in the service sector. The development of the four clusters mentioned above has been possible because frequently traditional industrial companies have developed new technological competences. These are backed by advanced business services and an institutional infrastructure facilitating the creation of and the access to the required knowledge. This institutional environment will be analysed in the next section.

5. The institutional structure and the local system of "governance"

In the following, we will describe the institutions, which have facilitated the transformation of the regional economy. We will concentrate on the five basic institutional conditions, which, within the framework of the EUROCAP-project, are regarded as being crucial for the enhancement of regional capabilities: Industrial relations, public welfare, R&D and technology transfer structure, regional patterns of education, and qualification and institutions facilitating the access to new markets.

5.1 Industrial relations

The trade unions are an important actor for the regional economy. Here in particular the metal workers union IG Metall has a considerable influence, since the region is a traditional industrial region. The trade union density of the labour force in the electrical and mechanical engineering sector is traditionally high (Klaus 1997). The trade unions are prepared to cooperate in the consensual renewal of the regional businesses. As early as the 80s they were engaged in promoting a work-orientated regional and structural policy after the take-over of Grundig by Philips. They demanded the qualification of the staff as well as the development of new products instead of redundancies (Dobischat/Neumann 1990). In the 90s the demise of the classical industries accelerated; „antiquated production plants" and „obvious shortcomings

[7] A sign for this is the high start up quota, which is the highest in Germany.

in logistics and the organisation of work“ were identified. Four out of ten Nuremberg companies were regarded as being in danger (Dörre 1999: 99). Given this background, the IG Metall demanded in the 90s a change in industrial policy and committed itself to consensual reorganisation strategies. In cooperation with some managers, more flexible forms of work organisation, teamwork and inter-company cooperation networks were built up in the so-called „consensual companies“. Complementary, „ since the middle of the 90s a network of associations, trade unions, consultancy agencies, scientific establishments, and local policies has been formed, which, in addition to the „consensual companies“, to a certain degree became the second pillar of the unions regional policy“ (Dörre 1999: 116).

The regional coalition of modernisation was supported at the Land level by the „Employment Pact Bavaria“. In 1996 this pact was agreed between the Land, the employers associations, and the trade unions and cancelled in 2002. Numerous measures for the improvement of the situation regarding training places were agreed. Furthermore, a labour market fund was created in order to qualify unemployed women and older employees. Thirdly the government of Bavaria committed itself to improve the employment situation by specific measures for newly-founded companies and for disadvantaged regions. It is estimated that in Bavaria almost 300,000 jobs have been saved and around 100,000 jobs created by this pact.

The planned ”new industrial relations” – which assigned the trade unions a central role in the regional modernisation coalition – nevertheless proved to be unstable for numerous reasons. On the one hand, the IG Metall only established consensual relationships with selected managers who were willing to cooperate. The management in particular of external groups, employers` associations and the Chamber of Commerce and Industry did not take part in this regional modernisation coalition (Dörre 1999). Additionally, some companies refuse help, if it is offered from the side of the unions (Interview 10). Therefore, the unions’ initiatives were limited to smaller regionally-embedded businesses. On the other hand, the scope of the reorganisation strategies proved to be too narrow.

In the Nuremberg region, a far-reaching process of change is in the process. Especially the traditional metal and electrical engineering companies have to develop fundamentally new strategies. Without company closures, without the transfer of activities to external service providers and foreign plants, without the development of new R&D competences, and without the development of new regional capabilities (for example counselling, market research, call centre, financial services) this change hardly would have been possible. This put excessive demands on an association, which draws its strengths and legitimacy from the representation of interests of the staff of existing companies. Altogether the “consensual companies” were

controversial within the individual companies as well as within the union. The different employees had different perceptions of how the unions work should look like. Both the flexible younger employees as well as the older employees, standing right before retirement, are not as much interested in the preservation of jobs but in higher wages, less working hours or a good pension. The younger ones can find a new job easier and the older ones can just retire if necessary. The employees between 40-50, who are too young too retire, but do not stand too many chances on the labour market are obviously mostly interested in measures saving jobs regardless of the conditions (e.g. longer working hours, lesser pay). Besides that, if the union makes concessions to one company, all companies from the same branch would want the same conditions. Therefore even within the unions the idea of the "consensual companies" was controversial (Interview 10).

Additionally, it is important to mention the relations between Siemens, the largest company in the region, and the labour unions or the works council. The relationship towards the IG Metall is "businesslike" correct (Interview 15). The relationship towards the works council seems according to the spokesman of the sales and distribution area office to be very stable. At present, the relationship towards both, the works council and the trade unions, has become tense, as the Siemens Corporation just recently announced plans to move several thousand jobs abroad. Obviously, Central Franconia is not the only region which has to cope with similar challenges as jobs in the Nuremberg and Erlangen divisions of PTS, TS and A&D are in danger. In this context, one of the biggest problems, not only in this region but in all of Germany is the fact that the labour and the non-wage labour costs are too high in the eyes of many companies. Therefore, labour intensive work, thus work done by non-skilled or semi-skilled workers, is reallocated (e.g. to Poland, Czech Republic, China etc.) [8]. Of course, this is a trend the trade unions are opposed to vigorously.

To keep companies from transferring added value activities abroad a representative of the IG Metall in Nuremberg is suggesting the following measures, of which some are already in operation and some still need to be worked on. Firstly the competences at the universities should be expanded in order to fit the industrial structure of the region to a greater extend. For example, the university has no professorships concerned with the energy industry and thus a deficiency of engineers with specific qualifications is noticeable in the region. Additionally, technology transfer at the universities should be improved. At present, the Friedrich-Alexander-University only has one position for technology transfer (at the University of

[8] Meanwhile even work that requires highly qualified employees is transferred to low-wage countries. In some technological areas (e.g. software development) the level of education in these countries does not differ from the one in Germany.

Applied Sciences it is only half a position), but over 2,300 scientists. Secondly vocational training should be aligned with the needs of the regional companies. More attention should be paid to what companies need during the value-added process. Thirdly the trade unions are open to concessions regarding wages or working hours, when the desolate situation of a company requires it. With so called recapitalization labour contracts it is possible to help companies through difficult times. Fourthly it should actively be tried to initiate innovation processes and thus to increase efficiency. This does not refer to product innovations only, but also to process innovations. However, according to the labour union representative networks of competence are only able to further product innovations and that their activities are not capable of modernising companies which are in need of rehabilitation.

Nevertheless, the IG Metall is involved in all the networks of competences and supports them. It has co-founded the EnergieRegion Nürnberg e.V and the CNA „Neuer Adler“e.V. One of the reasons for the IG Metall's (but also the Federation of German Trade Unions - DGB) strong support for the cluster policy is that they, along with all other institutional actors (cities, chambers, trade unions), were actively involved in designing the development guideline of the economic region. Consequently, a long term strategy was developed, everybody agreed to in general.

As mentioned above, the trade unions, and especially the IG Metall, find themselves in a very difficult situation. Without doubt, a restructuring of the region is inevitable. As it was easy to see in the past few years, this restructuring moves the employee demand towards highly qualified employees in the service and production sector, and away from low qualified production work. Unfortunately a reduction of staff cannot be avoided. Consequently, trade unions sometimes have to depend on companies and plants which are not seminal, in order to represent the interests of their members.

Finally, even though not directly belonging to the field of industrial relations, the relationship of the individual city governments towards each other is essential for the development of the region. Because of the spatial proximity the cities Erlangen, Fürth and Nuremberg have an especially tight cooperation within the region, as shown in the joint design of the development guideline as well as the joint marketing initiative “The Nuremberg Region” (together with other towns and administrative districts in the region) to promote the region inward and outward. Another example is the Innovation and Founders Centre (IGZ) funded by all three cities. The region as a whole is acting as one single actor towards national and international investors, companies, governments etc. Looking inside though, naturally

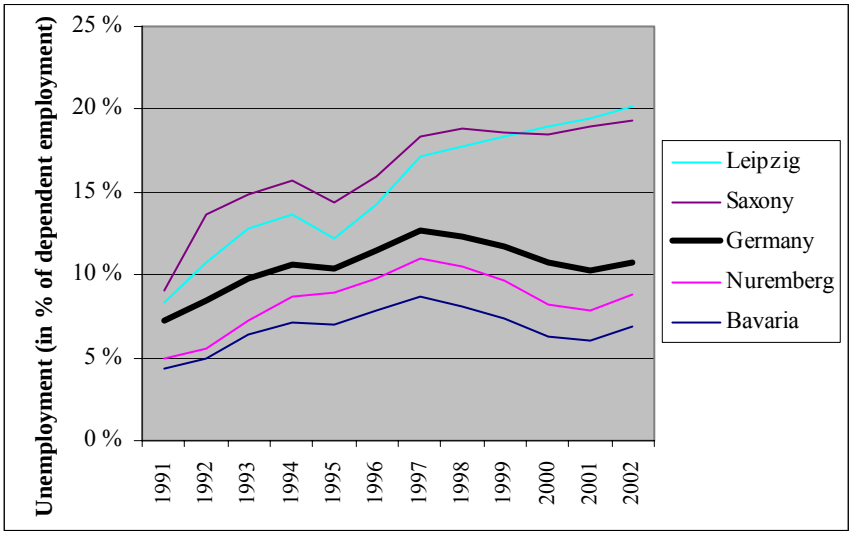
there is rivalry to be seen between the cities, since for example they compete for the same companies to be situated in their city. In sum, however, cooperation outweighs rivalry.

5.2 Public welfare

The structural change of the Central Franconian economy is accompanied by a sharp increase of the regional unemployment rate (cf. Figure 6). In Central Franconia, this rate is considerably above the Bavarian average (cf. Table 6). The unemployment rate for foreigners is particularly high. Within Bavaria a downward trend from North to South can be observed. As it can be seen, looking at the development of unemployment in Central Franconia, the unemployment rate in this region was growing constantly until the mid 90s, when it had a short recovery during the IT-Boom and then again started to grow in 2001. In respect to the unemployment rate of the individual cities, over the years Erlangen has maintained a lower unemployment rate than Nuremberg or Fürth. In February 2004, the unemployment rate in Nuremberg reached a peak of 14.4%, whereas Erlangen only had a rate of 8.2%. Fürth positioned itself with 12.4% in between (Source: Federal Employment Office). The rise of the unemployment rate can be explained with the structural change in the region (from an old industrial region to a service oriented region) and with the general stagnation in the German economy after the burst of the IT bubble in 2000/01. The reason why Nuremberg has such a considerably higher unemployment rate than Erlangen is that Nuremberg (as well as Fürth) has always been more orientated towards “old industries” than Erlangen, which mainly profits from Siemens Medical Solutions and the other four Siemens division headquarters (five of the seven Siemens divisions are based in Erlangen and only two in Nuremberg). Since the unemployment rate amongst foreigners is particularly high, and Nuremberg has almost 18.2% foreigners living in the city (Erlangen has approximately 12% and the Bavarian average is 9.4%) this also explains a fraction of the high unemployment rate.

The unemployed in Central Franconia are – like everywhere else in Germany – supported by unemployment benefit and assistance. 82.3% of the 48,501 unemployed at the unemployment office at Nuremberg in 2002, received financial support from the labour office.

Figure 6: Unemployment rates (in % of dependent civilian labour force) in Nuremberg and Leipzig (1991-2002)



Source: Federal employment office.

Table 6: Unemployment rates in Nuremberg und Leipzig (in %; 2002)

	Germany	Bavaria	Central Franconia	Saxony	Leipzig
Unemployed (in % of all civilian labour force)	9.8	6.0	7.8	17.8	18.6
Unemployed (in % of the dependent labour force)	10.8	6.9	8.8	19.3	20.2
Unemployment rate - men	11.3	7.2	9.3	19.0	21.6
Unemployment rate - women	10.3	6.5	8.2	19.7	18.7
Unemployment rate – those under 25	9.7	6.2	7.2	15.4	17.0
Foreigners	19.1	14.3	20.1	41.1	43.0

Source: Statistics of the Federal Employment Office.

The percentage of people receiving social assistance in Central Franconia is considerably below the federal average (Table 7)

Table 7: Those in receipt of continuous social assistance (2000).

	Those in receipt of continuous subsistence support	Percentage of the population
Federal Republic of Germany	2,693,527	3.3%
Bavaria	214,342	1.8%
Central Franconian administrative district	43,547	2.6%
Saxony	110,989	2.5%
Leipzig administrative district	35,837	3.3%

Source: Federal Statistics Office, 2002: Data base „Statistik regional“.

Table 8: Day establishments for children (1998)

		Total	Available places, for children in		
			crèches	kindergarten	day nursery
Germany	Available places	3,104,441	166,927	2,486,780	450,734
	Ratio children/places		7.0%	105.2%	12.6%
Bavaria	Available places	417,938	5269	380733	31,936
	Ratio children/places		1.4%	97.4%	5.7%
Cent. Franconia	Available places	6,087	571	54328	5971
	Ratio children/places		1.1%	103.6%	7.9%
Saxony	Available places	228,004	20,866	97,105	110,033
	Ratio children/places		24.1%	134.9%	69.2%
Leipzig	Available places	60,645	6,386	23,279	3,098
	Ratio children/places		30.7%	135.2%	7.9%

Ratio children/places: Children in crèches as % of children up to 3 years old; children in kindergarten as % of children aged 3-6 years; day nursery children as % of children aged 6-10 years.

Children in crèches are those who have not had their third birthday before the end of the previous month; Children in kindergarten are those whose fourth year of life commences in the current month until they go to school; Day nursery children are those of primary school age.

Source: Federal Statistics Office, 2002: Data base „Statistik regional“.

In Bavaria and Central Franconia the availability of nursery and kindergarten places in public institutions is considerably below the German level (cf. Table 8). This can be interpreted as an indicator for a traditional vision of the family. Nevertheless, in Central Franconia (but not in Bavaria as a whole) the difference between the employment rates for men and women is lower than on the federal level (cf. Table 11).

It became obvious during interviews with Siemens employees and representatives of the cities that, looking closer at the individual cities Nuremberg and Erlangen, kindergarten places are scarce in Nuremberg, whereas there is a sufficient supply in Erlangen. The Siemens corporation does not have an own company kindergarten. According to a Siemens spokesman it has proved to be very difficult to measure the need for kindergarten places in such a large company, which would result in high costs to obtain such an institution. Additionally, the commuter belt of the company is very large stretching as far as Bamberg and beyond. It is possible that many children would have to be pulled out of their social environment to be put into a kindergarten in Nuremberg. The only institution we know of, that has a kindergarten of its own is the Fraunhofer Institute for Integrated Circuits.

With regard to medical care there are no systematic differences between the regions (cf. Table 9).

Table 9: Medical Care (2000)

	Doctors per 1000 inhabitants	Hospital beds per 1000 inhabitants
Germany	3,58	6,81
Bavaria	3,27	6,85
Central Franconia	3,25	6,72
Saxony	3,55	6,66
Leipzig	3,78	6,96

Source: Federal Statistics Office, 2002: Data base „Statistik regional“.

5.3 R&D and technology transfer

The industrial region of Central Franconia is one of the most technologically-intensive regions in Germany. In 2000, 1,267 patents were applied for and therefore 3.7% of all German inventions. Measured by the number of patent applications per 100,000 inhabitants, the industrial region of Central Franconia takes third place in Germany behind the regions of Stuttgart and Munich (Greif 2001 and Table 10). The intensity of patents is twice as high as in Germany in total 81.5% of the patents were applied for by companies, 16% by independent inventors and 2% by science. According to the applications for patents of the European Patent Office, Central Franconia occupies with 446 applications per one million inhabitants as well a leading position far above the German (272) and European levels (140) (cf. Table 10).

Greif (2001) describes the specialisation profile of the region as follows: „In the region of Central Franconia the accent on patent activities also lies in the areas of electronics, information technology and general electrical engineering. Alongside this however precision instrument and testing technology and mechanical engineering are also important areas. With a relatively high quota of inventions in the area of public health the region of Central Franconia presents itself as the a centre of medical technology in the German research scene“ (cf. Figure 7). 51.4% of all patents were applied for in these five areas. This specialisation profile also refers to the role of Siemens, which, with 2,290 applications for patents in the year 2000, was the most prolific German company in applying for patents. The most prolific central Franconian company, INA Wälzlager Schaeffler oHG, made “only” 192 patent applications in the year 2000. In this respect it can be assumed that the patent activity in Central Franconia predominantly comes from one single company (in 1994 Siemens made 27% of their patent applications in Nuremberg; see Greif 1998:13). Additionally, small companies have their fair share in patent activities, since most of the small start-up companies are founded on the basis of an invention, i.e. with a patent (Interview 5: 14).

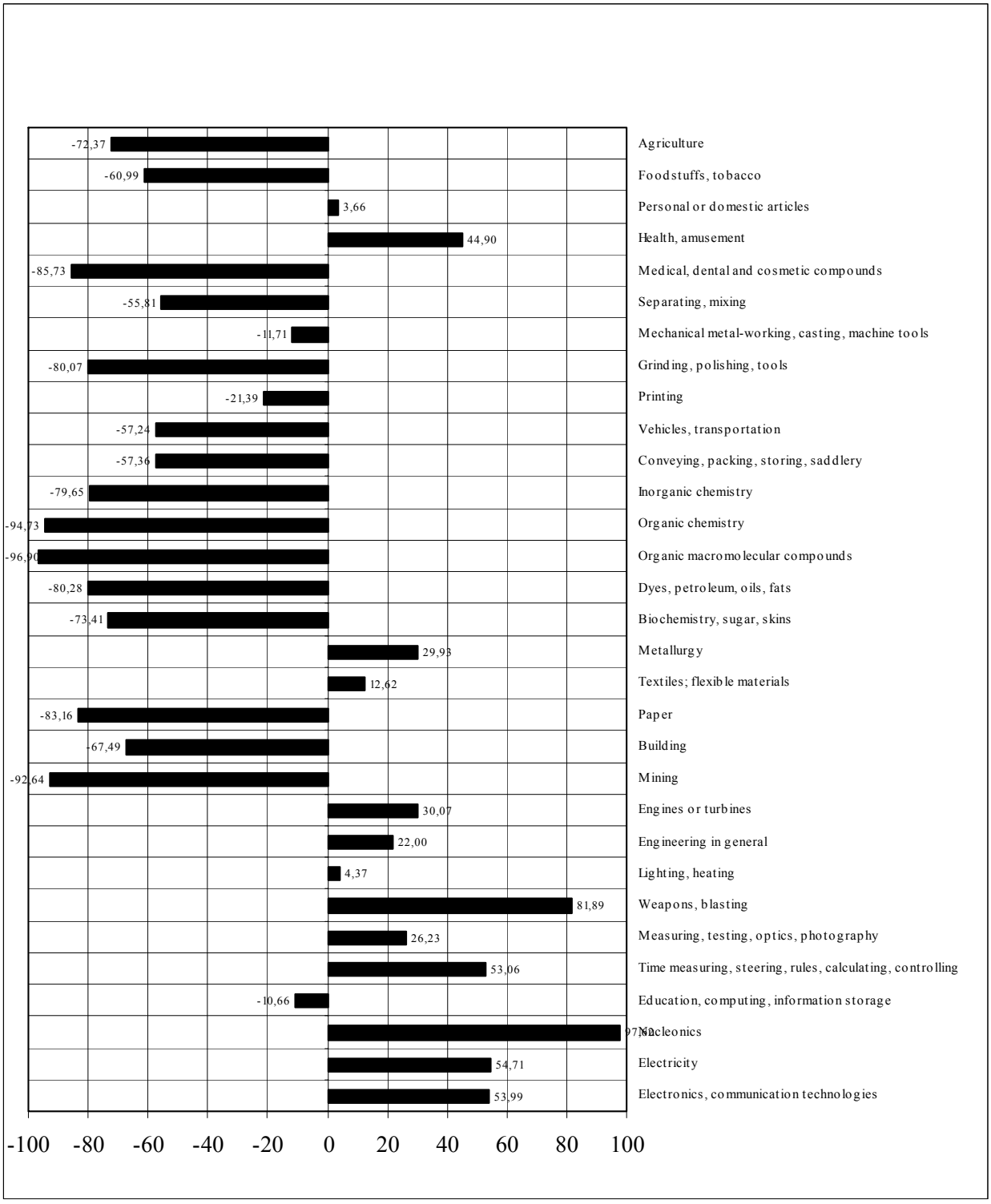
In 2003, the number of patent applications was for the first time lower than the number in previous years. There are a number of explanations why this was the case. One possible explanation, is that with the downsizing of companies like Lucent (from 2,300 employees in 2000 to 1,400 employees in 2003) or with the insolvency of companies like Grundig the research and development potential shrunk and thus the patents. Another, very likely possibility is that many small and medium sized companies did not have as many patent applications as in previous years. Patent applications are time consuming and costly and with the German economy being in difficulties and especially small and medium sized companies being most severely affected by that, it is not surprising that many of them do not have the capital to invest in patent applications or in research and development activities. It is very likely that many of these companies had to scale down their cost intensive R&D departments in the course of saving measures.

Table 10: Applications for patents in selected German planning regions

		Stuttgart	**Munich**	**Düsseldorf**	**Rhine-Main**	**Leipzig**	**Industrial region of Central Franconia**	**Germany**
Patent applications	1995	2539	1981	1632	1517	131	998	29690
	2000	3653	3091	1901	1680	140	1267	40374
Percentage of the domestic patent applications	1995	8.6%	6.7%	5.5%	5.1%	0.4%	3.4%	100%
	2000	9.0%	7.7%	4.7%	4.2%	0.3%	3.1%	100%
Patent applications per100.000 inhabitants	1995	98.4	82.9	54.7	56.8	n/a	78.9	36.2
	2000	141.3	129.4	63.7	62.9	12.7	100.2	49.2

Source: Greif (2001).

Figure 7: Patent specialisation in Central Franconia 1995 – 2000 (in comparison with the German mean)



The relative patent share (RPS) for the existing data was calculated according to the following formula: (RPSij) = 100 tanh ln [(Pij / ∑j Pij) / (∑j Pij / ∑ij Pij)], with Pij: Number of patents in a country/in a region i in the technological field j.

Source: Own calculation on the basis of Greif (2001).

Table 11: Population, labour market and innovation in Central Franconia and Leipzig

	European Union (EU 15)	**Germany**	**Bavaria**	**Central Franconia**	**Saxony**	**Leipzig**
Population in 1000, 2000	375,460	82,188	12,187	1,685	4,442	1,094
GDP per capita (PPS 2000, EU15 = 100	100	106.4	124	126.3	70.4	75
Employment rate (ages 15-64 as % of pop. aged 15-64), 2001; Total	64.3	65.7	71.4	69.3	62.2	61.7
Employment rate (ages 15-64 as % of pop. aged 15-64), 2001; male	73.5	72.6	78.7	75.6	65.5	64.9
Employment rate (ages 15-64 as % of pop. aged 15-64), 2001; female	55.1	58.7	63.9	62.9	58.8	58.4
Unemployment rate (%) Total, 2001	7.6	7.8	4.3	5.2	14	14.3
Long term unemployed, 2001 (% of total unempl.)	42.5	49.6	43.4	46	55	56.8
Unemployment rate (%) female, 2001	8.9	8.1	4.4	5.4	15.7	15.2
Unemployment rate (%) young, 2001	15.1	9.2	4.7	5.3	16.7	16.5
Employment by sector (% of total), 2001 Agriculture	4.1	2.6	3.6	2.9	3.1	2.3
Employment by sector (% of total), 2001 Industry	28.5	32.8	36.2	36.7	33.2	28.7
Employment by sector (% of total), 2001 Services	66.7	64.6	60.3	60.4	63.7	69
Educational attainment of : persons aged 25-59 (% of total), 2001 low	34.2	16.1	18.5	18.6	4.7	5.1
Educational attainment of : persons aged 25-59 (% of total), 2001 medium	43.5	59.7	58.3	56.7	65.2	65.4
Educational attainment of : persons aged 25-59 (% of total), 2001 high	22.3	24.2	23.3	24.7	30.2	29.5
R&D Expenditure in % GDP (1997)	1.85	2.3	2.9 (1999)	2.5	2.2	2.2
High and medium high tech manufacturing (in % of total employment; 2002)	7.4	11.4	14.1	14.1	7.4	5.8
High-tech manufacturing (in % of total employment; 2002)	1.3	1.9	2.4	2.5	1.6	1.4
Knowledge-intensive services (in % of total employment; 2002)	33.3	31.8	30.4	31.1	30.1	34.6
High-Tech-services (in % of total employment; 2002)	3.6	3.3	3.2 (1999)	3.6	2.2 (1999)	3.3
EPO patent applications per million inh., average 98-99-2000	140.1	271.9	440.1	445.5 518 (`01)	81	36.2
High tech patent applications - 2000 per million inhabitants	32 (2001)	49 (2001)		95.18		3.49
Human resources in science and technology (% of population (25-64 years) with 3rd level education; 2000)	12.9% (1997)	22		21		31

High tech Manufacturing: 30 Manufacture of office machinery and computers; 32 Manufacture of radio, television and communication equipment and apparatus; 33 Manufacture of medical precision and optical instruments watches and clocks;
Medium-high tech manufacturing: 24 Manufacture of chemicals and chemical products; 29 Manufacture of machinery and equipment n.e.c.; 31 Manufacture of electrical machinery and apparatus n.e.c.; 34 Manufacture of motor vehicles, trailers and semi-trailers; 35 Manufacture of other transport equipment;
Knowledge-intensive services: 61 Water transport; 62 Air transport; 64 Post and telecommunications; 65 Financial intermediation, except insurance and pension funding; 66 Insurance and pension funding, except compulsory social security; 67 Activities auxiliary to financial intermediation; 70 Real estate activities; 71 Renting of machinery and equipment without operator and of personal and household goods; 72 Computer and related activities; 73 Research and development; 74 Other business activities; 80 Education; 85 Health and social work; 92 Recreational, cultural and sporting activities. Of these sectors, 64, 72 and 73 are considered high tech services.

Source: Strack (2003), European Commission, 2003: Second progress report on economic and social cohesion. Brussels, COM(2003) 34/4; European Commission, 2001b: Regions: Statistical Yearbook 2001. Luxembourg: Office for Official Publications of the EC.

In an international perspective, the central Franconian sectoral structure is characterised by advanced and High Technologies. Whilst the employment ratio of knowledge-based services ranks with 31.1% (2002) below the national and European average, the ratio of advanced and leading-edge technology is with 14.1% (2002) considerably above these averages. The central Franconian economy is particularly strong in leading-edge technology (for example medical precision instruments) (cf. Table 11).

In a European perspective (see Strack 2003 and Table 12), Central Franconia ranks on the 11th place in advanced technologies and on the 14th place in High-tech manufacturing. As the number of employees in both fields has indeed fallen in the last five years, whilst the other European NUTS-2 regions (comparable to administrative districts) can report an average yearly increase in the number of employees in these sectors of 0.9% and 0.3% respectively, the relative position of Central Franconia in both sectors has declined (1997: 8th and 13th place respectively). This also applies to the quickly expanding sectors of knowledge-based and technology-related services. These employment sectors are expanding in Central Franconia, however, the rate of growth is below the average yearly growth rates in the EU (1997-2003: 3.1 and 5.5%).

Table 12: Relative position and growth of high tech and medium-high tech manufacturing and knowledge-intensive services in Central Franconia and Leipzig

	Central Franconia		**Leipzig**	
	Ranking (2002; among 207 European regions)	Annual average growth rates in % (1997-2002)	Ranking (2002; among 207 European regions)	Annual average growth rates in % (1997-2002)
High and medium high tech manufacturing (in % of total employment; 2002)	11	-0.7	118	-1.4
High-tech manu-facturing (in % of total employment; 2002)	14	-3.4	79	14.5
Knowledge-intensive services (in % of total employment; 2002)	110	1.9	79	2.6
High-Tech-services (in % of total employment; 2002)	61	1.4	75	7.9

Source: Unpublished calculations of EUROSTAT (cf. Strack 2003).

On the one hand, it can be maintained that Central Franconia is one of the most technology-intensive German and European regions. Both the patent applications and the employment rates in high- and leading-edge technology point to outstanding technological

competences. On the other hand, however, it can be presumed that these regional technological competences are to large extent competences of one single company, the largest industrial employer of the region. From an organisational point of view, the diversification of the regional innovative potential is rather low – even if the Siemens AG is active in many different technological fields. It has also to be taken into account that the knowledge-intensive employment sectors in industry as well as in service industries have shrunk or have shown below-average growth in the last few years.

Given this background, a coalition for facilitating the sectoral and technological transformation of the region has been formed in the 90s. In this respect, special importance has to be attributed to the Bavarian State Ministry for Economy, Transport and Technology, the city of Nuremberg, the Nuremberg Chamber of Commerce and Industry for Central Franconia, and the Erlangen-Nuremberg University. These actors are, on the one hand, attempting to deepen and broaden the technological knowledge-base of the region by setting up new research and development centres. On the other hand, the cooperation and the exchange of knowledge between different regional actors are intended to be intensified.

The strategies for broadening the technical competence base can be founded on seven regional universities, in particular on the Erlangen-Nuremberg University and the Georg-Simon-Ohm University for Applied Science in Nuremberg. The university Erlangen-Nuremberg has 11 faculties, including a medical (1,077 employees), a technical (1,236 employees), and three natural science faculties. With 450 professors, 11,759 professional and part-time staff members (2001) and approximately 21,200 students it is the largest university in northern Bavaria. In the 2002/2003 winter term the students were spread as follows over the five main fields of the university: (1) Legal, social and economic sciences: 33%, (2) Humanities and cultural sciences: 25%, (3) Natural sciences (including informatics): 19%, (4) Human medicine and dentistry: 13%, (5) Engineering sciences: 10%.
Some research topics of the university are life sciences, modelling and simulation, material sciences, mechatronics, and optical research. The German Research Foundation has assigned nine priority programmes to the university – especially in medical, technical and scientific fields.

The Georg-Simon-Ohm University for Applied Science has 260 professors, 7,500 students (2002) – mostly in the technical and economic fields (3,970 and 2,161 students respectively).

Considering the different fields of both universities, the most outstanding ones are medicine, natural sciences (including informatics), and engineering as well as the technical

fields in general according to most of the interviewees. These scientific fields were especially emphasised as mainly the chairs of these departments are closely cooperating with regional companies. Generally it can be stated though, that mainly large companies use the research potential in universities. This is mainly due to the slow moving behaviour of an institution like the university (Interview 7: 7). Small companies do not have the time to deal with the university for a long time. Additionally, it seems to be difficult to find out where aid money or even the own company money has gone to in the "black box" university.

According to the managerial head of the medicine and pharmaceutics network of competence and according to the head of the Siemens company site in Erlangen the cooperation in the medical sector between the university chairs, institutions, university hospitals, and Siemens Medical Solutions is very close. However, it is difficult to quantify this cooperation, since it does not take place on a continuous institutional basis, but is punctual and project bound. The same applies to chairs in the technology department of the Friedrich-Alexander-University and the University for Applied Science. Cooperation between the research centres of the individual business segments of Siemens seems to take place, even more than the cooperation with the universities, only in particular cases. One example for this is the development of the health card (saves all patient information; possibility of an electronic prescription etc.), which takes place in close cooperation of Siemens Medical Solutions (Erlangen), Siemens Business Services (Fürth) and Siemens Information an Communication Networks (Munich).

From the trade union it was expressed that the research and teaching topics at the universities are not sufficiently adjusted to the regional economy. Especially the faculty for business administration, economics and social sciences does not seem to meet the trade unions expectations, since most of their research topics are not concerned with the regional economy. According to the trade union, departments and scientists in the field of power engineering are also missing. A spokesman of the city of Nuremberg has additionally criticised how difficult it is to get the university to, for example, create a new, application oriented chair (even with state funds). According to this spokesman the cooperation with the University for Applied Sciences is much easier, since the structures are not as stiff as at the Friedrich-Alexander-University. A definite example for this would be the creation of a new chair in the Field of propulsion technology funded by the Bavarian government, which, out of the named reason, was established at the University of Applied Science.

None of the 12 Bavarian Max-Planck-Institutes (fundamental research) is located in northern Bavaria, but a new Max-Planck-Research Group for Optics, Information and

Photonics was established on the new Research Technology Campus in Erlangen, which used to be a Siemens research site. Nonetheless with the two Fraunhofer Institutes the regional institutes concentrate more on applied research. The Fraunhofer Institutes are located in the region and are concentrated on the area of microelectronics – integrated circuits (IIS) and integrated systems and component technology (ISB). In addition, within the first institute, a Fraunhofer working group for cordless telephone communications and multimedia technology and a user-centre for transport logistics and communications technology was established and continues to operate. Since 1984 the area of microelectronics has been supported by the Ministry of Economy with grants of approximately €105 million. As the Federal Government takes on 90% of the costs of the Fraunhofer Institutes, the federal share is correspondingly greater.

The Fraunhofer Institutes are very important for the regional research structure since they conduct practical research, which is of immediate importance to companies. According to a number of Interviewees the number of innovative spin-offs out of the institutes is rather high, resulting in a close connection between the companies and the institutes. Another advantage of the Fraunhofer Institutes compared to e.g. the universities, is that the continuity of the employees within this institution is higher and thus the continuity of (long term) studies becomes more likely (Interview 4).

Within the framework of the Bavarian High-Tech-Offensive (2000), further competence centres in the area of „network access technology“, „optical communications technology“ and „interoperative systems“ are to be promoted. These activities and further research into the theme of logistics and communications technology and mechatronics are concentrated in the research centre „Northeast Park Research Factory“ (Bavarian Ministry of State 2003) with 85 staff at present, which opened in 2003. The “Research Factory” is part of a greater complex named “The Northeast Park”, which functions as a high-tech and research centre for start-up and established companies and for institutions (e.g. Lucent or the Fraunhofer Institute for Integrated Circuits, division for applied electronics). It seems though, that a random mix of transportation and logistics scientists, together with communications engineers and production companies has settled there. As a matter of fact a vast diversity of companies has chosen to inhabit the site. The companies range from software development over printing technology to environmental engineering and it does seem difficult to establish synergies between the companies. Examples where these synergies have been established or are likely to be established are the IZMP (Innovation Centre for Medicine and Pharmaceutics) and the etz (Energy Technological Centre). In both centres, companies and institutions from a

particular field have moved in. It is needless to say that it is not possible to force cooperation. However, spatial proximity is a good basis for communication and cooperation within and across a field (although there is no proof for that in our example).

Within the framework of the regional high-tech-offensive, the development of an electronic commerce platform, the setting-up of an infrastructure institution for call-centres, the technology transfer institute of "Bayern Innovativ", founded in 1995, the building of the Bavarian Foreign Trade Centre in Nuremberg, and the enlargement of the Nuremberg Fair are to be promoted.

Additionally, by these means, competence centres in the areas of telecommunication, medical technology and pharmaceutics, mechatronics and new materials have developed over the past few years. As mentioned above, the function of the networks of competence is to establish efficient networks within a competence field, to interlink the different actors, and to facilitate technology transfer. This task seems to have been mastered well in most of the initiatives. All important scientific and governmental institutions are members in the corresponding initiatives as well as most of the important companies. Not all companies have interest in joining "clubs" like that. Mostly it is small companies who believe they do not have the time and money to engage in activities like that.

Unfortunately, it is impossible to exactly state the effect the initiatives had on the technology transfer between the actors or their R&D activities. None of the interviewees was able to quantify their success. However, in each initiative there seemed to be at least a few examples of successful co-operations.

Although the networking on the basis of the individual initiatives seems to be working well, the cooperation of the initiatives and – more important - the corresponding industries and companies with each other does not take place on a regular basis. Some companies are member in more then one initiative resulting in up to date information on the developments in several fields. Also the initiatives themselves are in contact, however, there is no umbrella organization, which coordinates the activities of all of the initiatives and interlinks them in a way to enable possible synergies (this can happen on a regional level but also on a Land level). One way to achieve this regionally is to have a joint back office. This would be a possibility to cut costs and to promote closer cooperation among the initiatives. According to the managerial head of NIK, another way would be the establishment of an organisation which can function as a project executing organisation. Neither the city nor the initiatives have the financial or human resources to be able to guide state funded or other projects all the way down to an operational level. This would then be the job of an umbrella organisation. It

would be possible to leave the restricting level of technology fields and think in projects, so that the interaction with different sectors would be made easier. Nonetheless the level of network cooperation is much higher in the Nuremberg region than in many other regions (see Leipzig) and most of the actors have realised their importance.

Complementary to these networks of competence, the regional Chamber of Commerce is coordinating a number of user-clubs, in order to support technology transfer (e-business, data protection, new materials, non-destructive material testing, technology and innovation management, quality management, energy, environment and job-protection). The user-clubs meet on a regular basis, so that users and suppliers can come together and are able to interact.

Altogether the cities and the companies themselves are involved in a lot to further technology transfer and R&D activities in the region. Additionally, the state is sponsoring a large number of projects in the five different competence fields (communication and multimedia, transport and logistics, energy, medicine and pharmaceuticals, new materials). The statement of Sträter (1991:13) therefore surely cannot be maintained: „In a regional comparison the Nuremberg area has a serious deficiency in the number of research and development personnel in companies and research establishments outside of universities".

5.4 Education, qualifications, skills

At the beginning of the 90s, the qualification structure of the region was viewed with extreme scepticism. „The Nuremberg area has ... a high proportion of poorly-trained employees and only a small proportion of highly-trained ones ... therefore the demand for the development of engineering departments associated to the universities of the region is repeated." (Sträter 1991: 13)

In Table 13 it can be seen that this opinion is no longer valid. It is true that the proportion of unqualified personnel in Central Franconia is still above the Bavarian and German average. At the same time, however, the proportion of those having taken final examinations in secondary schools is considerably higher than in Bavaria or Germany (cf. also similar to the EUROSTAT figures in Table 11).

Table 13: Type of training completed by employees subject to social security (total, according to sex and non-Germans; June 2000)

		Employees subject to social security in their place of work (June 2000)			
		Total	**male**	**female**	**Foreigners**
Germany	Without having completed vocational training	18.0%	17.6%	18.4%	41.1%
	With completed vocational training	62.7%	61.9%	63.8%	32.5%
	Having completed studies at a technical college, institute of higher learning or university	8.5%	10.1%	6.4%	4.4%
	Total (including nil returns; 100 %)	27,825,624	15,543,911	12,281,713	1,963,090
Bavaria	Without having completed vocational training	20.2%	18.3%	22.6%	40.3%
	With completed vocational training	62.4%	62.9%	61.8%	34.5%
	Having completed studies at a technical college, institute of higher learning or university	8.1%	10.4%	5.2%	5.0%
	Total (including nil returns, 100 %)	4,364,659	2,448,921	1,915,738	359,809
C. Franconia	Without having completed vocational training	21.1%	18.3%	24.6%	46.7%
	With completed vocational training	61.5%	61.8%	61.2%	29.9%
	Having completed studies at a technical college, institute of higher learning or university	8.7%	11.8%	4.9%	4.5%
	Total (including nil returns, 100 %)	643,949	358,828	285,121	54,967
Saxony	Without having completed vocational training	10.3%	11.1%	9.5%	14.0%
	With completed vocational training	68.9%	68.0%	69.9%	42.1%
	Having completed studies at a technical college, institute of higher learning or university	11.9%	12.2%	11.6%	15.5%
	Total (including nil returns; 100 %)	1,526,531	796,879	729,652	9,993
Leipzig	Without having completed vocational training	10.5%	11.2%	9.7%	15.1%
	With completed vocational training	66.3%	65.2%	6.7%	36.2%
	Having completed studies at a technical college, institute of higher learning or university	12.2%	12.6%	11.8%	13.9%
	Total (including nil returns; 100 %)	382,723	197,029	185,694	3,235

Source: Federal Statistics Office, 2002: Data base „Statistik regional“.

The number of graduates in the year 2000 (cf. Table 14) does not, however, support these results. In Bavaria, the proportion of those with A-level school-leaving certificates is considerably lower than in Germany as a whole, whilst the proportion of pupils with and without a “Hauptschule” school leaving certificates is above the German level. The high selectivity of the Bavarian school system in fact goes alongside a higher scholastic capability (cf. Baumert et al. 2002). Certainly the proportion of students to the population of Bavaria is below the German average (2000: 1.8 % compared with 2.2 %). It is, however, an open question as to whether these below-average quotes for students and academics – which still lie below the German figure, itself low when compared internationally (OECD 2003) – are to lead to bottlenecks in the economic development in the region of Central Franconia. Indeed there are a few qualifications which are missing in the regions according to the interviewees.

It is especially difficult to get software developers, engineers with specific qualifications and skilled employees in areas like metal or chemistry.

According to the head of the Siemens company site in Erlangen software developers can be found all over the world to a much cheaper price than in Germany. Siemens employs a number of foreign developers in Germany, additionally to the software developers in India or other countries. Being a service which can easily be transferred, it can be rendered regardless of the location. Nonetheless Siemens trains software developers in the company and supports university departments in the field (e.g. the Chair of Medical Informatics at the Friedrich-Alexander-University).

According to a trade union spokesman, especially engineers in special fields of energy are missing in the region. A spokesperson of Siemens confirmed that impression, although in this case as well, the regional labour market is not decisive, but the national and international one. Even if in Germany the number of students in different kinds of engineering is rising slowly, the low interest in this field in previous years still leads to a lack of graduates resulting in a higher demand than supply (Source: http://www.vdi.de/imperia/md/content/hg/15.pdf). This is not only the case in Central Franconia but in Germany in total.

Skilled employees with a well-founded vocational training are missing in a few areas as well. Here especially small and medium sized companies have difficulties finding the equivalent personnel. These companies do not have the money to train their own staff. Since many companies think they do not have the financial resources to provide vocational training, employees in certain sectors (e.g. metal, chemistry) are scarce and so the businesses poach employees from other businesses making them even more expensive. Although, according to the managerial head of one of the initiatives (Interview 8: 4), the companies are well aware of the need to train new staff in order to maintain certain know-how, but still many only think of their short term success.

With certain qualifications not being present in the region, the companies have to recruit employees from the national or even international labour market. To attract highly qualified personnel it is important that more than just the salary is good. Equally important are the soft factors. In this respect the quality of life is an often named aspect. The region provides, according to the managerial head of the Innovation and Founders Centre a very high “quality of life for affordable prices”. The region has vast leisure time possibilities, good cultural offerings, and fairly reasonable living costs. The only problem is, that most people not living in the area do not know that. The image of the region is not as dazzling as the

image of cities like Munich or Berlin. It is the task of a marketing initiative like “The Nuremberg Region” to improve the image of the region and make it more interesting for potential employees (or investors).

Regarding the recruiting of qualified personnel, small and medium sized companies have more trouble than large ones. Especially when shortage of a certain kind of qualifications occurs large companies can pay higher wages and can offer better benefits than small ones. Therefore, smaller companies have to take measures in order to be able to employ the needed number of qualified personnel. Companies can do that with offering internships or the possibility to write the final year project in their company, so that the potential future employee already has a connection with the company (Interview 3: 14).

Altogether the demand for highly qualified academics and skilled workers in specialised fields is rising, whereas the demand for unqualified/low qualified workers and in some areas even skilled workers is decreasing. Labour intensive work can be transferred abroad where it is considerably cheaper.

It is the production factories which are the weak point of the region. It is on the other side not expected that Siemens research and development will have to face reduction (Interview 15). The individual headquarters of the divisions need competences within the region and it is very likely that this is going to stay research and development. Other companies as well need some kind of competence in the region in order for them to stay in the area. These competences should be, as the managerial head of the “Energy Region Nuremberg” emphasises, the quality and the innovative ability and thus the know-how of the region. But precisely this is something which has proven to be harder and harder to accomplish compared to other countries or regions.

Tabl 14: Educational schooling: Graduates/school-leavers after final examinations (2000)

	Total (100 %)	Without a school leaving certificate	With a "Hauptschule" school leaving certificate	With a secondary school level I certificate	With general college matriculation requirements (without technical college matriculation requirements)
Federal Republic of Germany	928,038	9.3%	24.8%	40.1%	24.7%
Bavaria	129,858	9.4%	36.3%	34.2%	20.1%
Central Franconian administrative district	17,963	11.1%	37.2%	31.5%	20.2%
Saxony	60,682	12.1%	11.2%	50.8%	26.0%
Leipzig administrative district	14,481	13.4%	11.9%	47.0%	27.7%

Source: Federal Statistics Office, 2002: Data base „Statistik regional".

5.5 New markets

The opening of the borders in Central and Eastern Europe already had and will have several consequences for Central Franconia and the whole of Germany in the future. Since the region is fairly close to Central Europe the effects of the EU enlargement on this region will even be greater than on many other regions in Germany and in Europe, making this occurrence very important for the area. The effects of the Eastern enlargement are supposedly going to be both positive and negative for the regional companies, employees, governments, and the economy as a whole. In the following paragraphs the apprehensions and opportunities of the enlargement, are going to be discussed.

The biggest apprehensions expressed are the consequences of the sizable gap between the wage levels in Germany and in Eastern Europe. Many companies have already moved production sites, warehouses etc. to the neighbouring countries making employees in Germany redundant. At present, it is especially labour intensive work that is moved and therefore low skilled workers have to suffer most from this development. According to the managerial head of the CNA network of competence many transport services have moved their low level production further east in order to stay competitive. With the rising and already comparatively high education level in Eastern European countries, high skilled work can be transferred as well. In this connection language does not seem to be a problem.

A second aspect is the bigger competition regional companies are facing. Companies from Eastern Europe can complete orders with a fraction of the costs and thus with a fraction of the prize as well.

Especially the transport and building industry in the regions close to the borders are going to be affected by this development (Interview 12: 13).

Nonetheless the eastern enlargement also holds chances for the region. It is likely that Central Franconia will reassume its traditional role as a focal knot in the exchange networks

between Eastern and Western Europe. The accomplishment of the Eastern enlargement of the EU could produce an extra thrust. Central Franconia could – according to the EU-Commission in 1999 – gain status as the „Gateway to Eastern Europe“. The Eastern enlargement brings a market of 75 Million people into the EU, which brings about an incredible sales potential for the companies located in this region. Today the regional industry already sells 42% of its products abroad. Particularly export-intensive are medical and control technology, the electrical and mechanical engineering industry and the automobile supply industry, which export more than half of their products (cf. Table 15). 2,500 foreign trading companies with branches throughout the world were counted in the region; 1,100 companies have connections with Central and Eastern European countries and the export to Central and Eastern Europe in Bavaria has almost passed the one to the United States (Interview 12: 12).

Table 15: Export share of the Central Franconian industry (Export in % of total sales, 2002)

Selected economic branch	**Volume of export of central Franconian industry (1000 €)**	**Central Franconia (in %)**	**Bavaria (in %)**	**Germany (in %)**
Medical, precision instruments, tax and control technology, optics	1,392,018	58.5	60.9	49.4
Appliances for the generation and distribution of electricity	4,199,440	55.5	46.5	36.4
Mechanical engineering	2,971,698	54.0	52.0	50.6
Vehicles and vehicle parts	770,929	53.6	63.2	59.6
Chemical industry	484,441	43.9	49.2	51.5
Furniture, jewellery, musical instruments, sports equipment	597,125	39.0	24.0	24.0
Of which are toys	*173,275*	40.9	39.6	32.7
Metal production and metal-working	374,374	36.2	34.8	38.6
Radio, television and information technology	645,939	32.3	62.6	54.8
Metal products	398,194	30.5	23.5	24.8
Other automobile construction	54,977	30.1	46.9	53.2
Clothing industry	25,652	29.2	34.3	32.2
Paper industry	105,436	24.4	37.9	36.1
Textile industry	17,794	22.6	36.0	37.3
Glass, ceramics, processing of stones and earth	120,921	20.3	26.8	22.4
Rubber and plastic goods	256,462	19.6	32.0	33.0
Timber industry (excl. furniture)	32,916	12.3	15.9	20.1
Nutrition industry	202,211	11.1	16.1	12.6
Publishing, printing industry, copying	137,139	10.2	8.3	7.7
Industry in total	12,914,787	41.8	43.8	38.0

Source: IHK (2003:83).

As mentioned above, many companies will transfer production sites, having an effect on the employment situation at home. However, with new markets emerging in Eastern Europe it is likely that these companies are going to grow and thus will need more personnel – in Germany as well. The "Institute of the German Economy" (DIW) expects a more efficient production and an increasing trade volume of Germany with the acceding countries, which

could lead to an additional economic growth of up to half a percentage point in the next two years (Source: Handelsblatt, 14.04.2004).

The Eastern Enlargement is without question a chance for local companies. It is of crucial importance though, that the location preserves its most important competences, which distinguish the Nuremberg Region (and the whole of Germany as well) from other countries. A high productivity, a high innovation potential and diverse research, and development activities have to be maintained and evolved even further. This is important in order to be ahead of international competition and be able to achieve higher profits.

One further aspect should be mentioned at this point. The concern mostly expressed during the interviews in the area was that the wage level in Eastern Europe is considerably lower and therefore companies are going lay off people in Central Franconia and move their sites towards the East. This is a very realistic concern considering that Siemens plans to reallocate thousands of jobs (including jobs in Nuremberg locations in traffic engineering and a transformer plant) further east. Nevertheless the stronger economic linkage with the rest of the EU will not be without effects on the wage structure in Central and Eastern Europe. It is likely that the wage structures are going to align in the long run. This does mean that Germany will not be able to hold its high wage level; however, the development of wages in CEE is already geared to the wage level in the rest of the EU. Even today a commercial director in the Czech Republic earns only 11% less than a person in the same position in Spain (Handelsblatt, 03.12.2004).

In addition to the named chances the region also has some favourable structures linking it to the international market. The region has an international airport, a modern Fair and Congress Centre (for example for the annual toy fair) and a large logistics and distribution centre. Additionally, the Bavarian Foreign Trade Centre was founded in 2001 in Nuremberg within the framework of the High-Tech-Offensive, in order to assist small and medium-sized businesses in opening up foreign markets.

6. Conclusion

In recent publications, the economic and technological capabilities of the Nuremberg/central Franconian region are assessed in extremely different ways. On the one hand, Central Franconia was described as a traditional industrial region in a deep crisis – a region which depends on the decisions of external headquarters and which is characterised by a low-qualified work force and a low intensity of innovation and research (Sträter 1991, Dörre 1999). On the other hand, the numerous applications for patents, the dynamic economic development, the intensity of patents, the high proportion of high-tech inventions and the altogether high strength of innovation are emphasised (see the relevant ranking lists in IHK 2003: 72-72).

The different findings cannot be clarified simply by the different times at which these assessments were made (for example by reference to the successful structural change since the crisis at the beginning of the 90s). Regional competences do not disappear within a period of a few years – and likewise they cannot be rebuilt in a few years. Rather the pessimistic and optimistic scenarios point to both sides of the same coin, namely the far-reaching change in structure of a traditional industrial region. On the one hand, in the context of a worldwide competition in innovation and costs this traditional industrial region is characterised by numerous legacies of the past. This is demonstrated by the low number of academics and those with A-levels and the limited number of technical courses in the regional universities. On the other hand, new technological competences and business activities can be developed on the basis of established industrial strengths. As well as the investments in the „knowledge infrastructure“ supported by the Land government and also the subsequent cluster policies of the regional actors (ICC, city of Nuremberg, trade unions) new competences and added value areas are created in a path-dependent way. Traditional strengths in the electrical and metal sectors were used as a basis for the development of new industrial competences (information and communications technology, microelectronics, new materials, logistics, energy technology) and new added value areas in the area of production-related services (market research, trade, consultancy, call centres, financial services).

Certain strength and weaknesses of the region were worked out in this paper and will be summarised in the following paragraphs.

The weaknesses of the region are predominantly found in the universities, the administration or politics respectively, the economical structure and sometimes the business structure as well. Although the educational environment of the region is principally sufficient,

there are a number of aspects which could be improved. Firstly in some areas the Friedrich-Alexander-University does not seem to be open for concerns of regional companies. Especially chairs and departments in the fields of “energy and environment” and “transportation and logistics” are missing. The public administration is above all blamed for lacking the ability to assert the realization of its projects. Furthermore, the individual cities have, although harmonious towards the outside, still their own interests, visions and projects, which sometimes leads to internal disharmony. As already discussed, the region is facing a structural change at the moment, so that the economical environment is still embossed by traditional industrial structures, which unfortunately does not bring many advantages in a knowledge oriented society, especially since simple production can be pursued much more favourable in other locations. The last weakness to be named is, as most interviewees saw it, the underestimation of the location both within and outside of the region. More than once the “understatement of the Franconians” was mentioned, who appear to feel disadvantaged especially compared to Munich. A “defined visibility” (Interview 7: 15), which defines itself at narrow responsibilities is missing towards the outside. With the exception of maybe medical technology a known image, which could establish the individual clusters nationally and internationally, is missing.

An additional point, which does not necessarily have to be a weakness, is that the technical potential of the region depends to a considerable extent on the competitive strengths of a few companies. Many of these companies are controlled by external headquarters. But the high proportion of divisions and plants belonging to major external companies does not have to be seen as a weakness of the regional economy. The level of employment in dependent branch offices and plants can be drastically reduced in times when business activity is weak. However, in no way are the company headquarters spared from such developments; this is demonstrated by the closure of many long-standing Nuremberg companies. The development of new regional competences would have been impossible without externally controlled international companies. The high export share of the central Franconian region shows how much the region profits from multinational companies – whether they have their headquarters in the region or elsewhere.

Concerning the business environment, it is remarkable that the individual companies are fairly well connected amongst each other as well as with the scientific and political institutions. The grown structures of the region have as a consequence that, especially in the fields of medical technology and IT and communications, a diversified structure of small as well as large businesses can be found. When many companies from one branch have already

settled in an area, this leads to other companies considering rather this location when thinking about further investments. Siemens Medical Solution, for example, is convinced that the fact that there are many other medical technology companies in the area is a clear advantage of this location (Interview 13: 3). Additionally, it has to be mentioned that the number of start-up companies in this region is the highest in the whole of Germany. This is to a great extend due to the regional and Land politics, which further entrepreneurship with projects like the "business plan competition". The Land government enforces the strengths of the region amongst others, with the funding of numerous projects in the context of the High-Tech-Offensive Bavaria. The regional administration is doing its best as well to make the area more attractive. For example: The building permit for the new Siemens Medical Solutions plant was issued in only six weeks (Interview 14: 9). The output of the cooperation, network and research initiatives of the municipalities, the Land government and the federal government is fairly effective. Projects and initiatives funded by the local or federal authorities seem to have a significant impact on the local economy. Although none of the interviewees was able to quantify the success, all of them had the impression that the region and its economy are moving forward.

The relationship with the trade unions is also mostly harmonious. As much as it is possible for them the trade unions are making an effort to make advances to employers and they are as well actively interested in a consensus and a development of the region.

The educational environment is despite the already named deficiencies very good. Apart from a few exceptions the education and the educational level in the region was described by the interviewees to be very good. The long engineering tradition was estimated to have a positive effect on the diverse research environment of the region (Interview 7: 14). Additionally to the just named factors the good infrastructure with many transport connections (international Airport, harbour, and motorways) is important. The geopolitical location in the centre of Europe makes the area more attractive as well. Last, but not least the quality of life is very high, and this to fairly reasonable prizes.

All together the region combines soft and hard location factors quite well. This can be seen in the regional ranking within 241 European regions were Central Franconia is 28th, and 4th looking among the German regions. In this region an incremental path-dependent state and company driven reorganisation of regional capabilities it taking place at the moment.

Another important aspect that has to be considered is the role of Siemens in the region. The question here is to what extent cooperative and exchange relations with regional actors (for example with the clinics at Erlangen, with newly-founded companies, with regional

suppliers and service providers) are playing and will play a significant role in the advancement of regional and organisational competences?

Siemens and Siemens Managers respectively are member of a considerable number of committees in the region (e.g. ICC, city council in Erlangen) and the company is represented in most of the networks of competence. It can be deduced from this that the company is strongly interested in the development of the location. Siemens takes also part in many cultural and social projects in the region. On the one hand, this bearing mirrors the maxim of corporate responsibility stated in the company's principles. On the other hand, especially the commitment to economical and political projects and institutions is a sign for the accuracy with which Siemens is monitoring this region in order to be able to predict further developments, in order to be able to have an influence on them and to, if possible, utilise synergies. Location decisions of such a company are based mainly on profitability. Therefore, it is probable that if the development of the region goes in an unwanted direction, which means a disadvantage for the company, then Siemens (as well as other companies) would not hesitate to make a negative location decision and to not invest in the region any more or to even disinvest. Because of this a focused cluster policy can absolutely have advantages. Concluding, it should therefore be solved, if the cluster policy propagated by the Land government, the cities and the ICC is capable to contribute to the development of the new technological competences and how the individual competences are doing right now.

Overall it can be said that the fields of medical technology and IT and Communications technology are the best developed and the most promising clusters in the region. Both clusters have important large companies (Siemens, Lucent etc) settled in the area as well as many innovative smaller companies. This in turn causes other companies to settle in the region and thus creates a pull effect. Medical technology depends, more than IT and communications, on one single company. The danger here is that, if Siemens should ever decide to leave this location or even to just downsize, the cluster will loose importance. On this account the activities of the initiative are very important, since it is trying to interlink the companies with each other and with the regional institutions and thus increase the connection to the region. The purposeful promotion of start-ups (not only in this cluster) has as a consequence that the cluster is, independently from Siemens, growing and developing further. The IT and communications branch in the region is fairly diversified and as a result of the networking activities the competences can be bundled better and can be aligned clearer. Furthermore, it is important for this cluster to promote the competences of the region to the outside, which is easier to do with an initiative like that.

It is not clear yet how the cluster new materials is going to develop. Here it is especially important to purposeful expand the research environment, so that competences in the field of research evolve. Such a purposeful expansion is easiest to accomplish with measures and funding of the regional and Land politics, whereas the role of a network of competence as a coordinating element, is important. If a good research environment, framed with the already existing companies can be established here, than the development of a, over the regions known, cluster is possible here as well.

The position of the other two clusters “energy and environment and “transportation and logistics” is a bit more contradictious. Both clusters have lost important companies and since they are both production based fields, many plants were already moved to more cost effective locations. Especially because these two clusters have a slightly worse starting position, financial aid and networks of competence are of great importance. The sector energy and environment should concentrate on the few actually promising fields and in doing this, governmental aid and the initiatives can be helpful. Here the strengths can be bundled and thus the individual fields can be established. The same thing applies for the transportation and logistics cluster. However, the network of competence brings one additional advantage. It has already established relationships to other initiatives and other regions and therefore the competences lacking in the Nuremberg region can be complemented.

Finally, it can be said that a regional cluster policy, which is based on sufficient governmental funds can definitely help to develop new technological competences within a region. The success of the cluster policy depends to a great deal on how promising the field is estimated to be in the future, on the international competition and on the already existing structure of the cluster. Cluster policy can therefore further strengthen and help to decrease weaknesses.

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