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**Conference Paper**

## Regional embeddedness of information economy enterprises in Germany

42nd Congress of the European Regional Science Association: "From Industry to Advanced Services - Perspectives of European Metropolitan Regions", August 27th - 31st, 2002, Dortmund, Germany

**Provided in Cooperation with:**

European Regional Science Association (ERSA)

*Suggested Citation:* Matuschewski, Anke (2002) : Regional embeddedness of information economy enterprises in Germany, 42nd Congress of the European Regional Science Association: "From Industry to Advanced Services - Perspectives of European Metropolitan Regions", August 27th - 31st, 2002, Dortmund, Germany, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/115730>

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## **Regional Embeddedness of Information Economy Enterprises in Germany**

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### **1. Abstract**

In Germany similar to other countries Information Economy enterprises tend to concentrate in a few regions, such as Munich, Hamburg, Cologne or Berlin. What are the reasons and driving forces for regional clusters within the Information Economy? Which spatial relations do enterprises have? To what extent do they need the region as a resource and stimulating milieu, and to what extent do the enterprises provide impulses for regional economic development? The paper presents results of an empirical analysis in Hamburg, Dresden-East Saxonia and the "TechnologieRegion Karlsruhe" indicating the importance of material and immaterial relations and the relevance of different theoretical concepts to explain the development and dynamics of regional clusters.

### **2. Introduction**

The Information Economy is an emerging sector that results from the growing importance of information within the economy and a process of change and congruence of different subsectors, such as traditional media, advertising, software and telecommunication. The Information Economy (IE) can be defined as comprising all economic activity that is based on the production, processing and distribution of information and the instruments needed for it (MILES 1990, HOUGHTON 1999). The primary IE-sector analysed here covers all enterprises in which these activities are the main economic purpose (Table 2.1).

Starting point of the project is the observation that IE-enterprises tend to concentrate on a global as well as on a national and subnational scale. With a focus on Germany, a number of regional clusters have emerged - mainly metropolitan regions such as Munich, Cologne, Düsseldorf, Hamburg and Berlin. This process of regional clustering

is happening against the background of a general tendency towards global markets, co-operations and strategic alliances, and the observation that at least in some sectors of the Information Economy firms operate in highly dynamic markets with rapid technological development, short innovation and product cycles. These trends have been interpreted in the way, that they lead enterprises to international business orientation and thus also international (re-)location processes with loosening local roots (HAGEDOORN 1993).

Table 2.1: Structure of the Information Economy

Sector	Subsector
Information Technology	Hardware
	Software
Information Transmission	Telecommunication infrastructure
	Telecommunication services
Content	Content Provision
	Services

Today we know, that even under circumstances of a globalized economy enterprises do not become totally 'footloose'. They still have local ties, and the process of relocation has not become that fundamental (STORPER 1997: 169 ff.). The focus of the research project is on the analysis of the background and the development process of regional IE-clusters in Germany. Which connections can we find between regional concentration of IE-enterprises and their business transactions and relations? Are they spatially connected, or has the concentration developed "just by chance"? Or, from the point of view of regional policy: In which aspects and to what extent do enterprises need the region as a resource and stimulating milieu? Which regional impulses does the regional economy get from the enterprises?

### 3. Theoretical Background and Research Concept

The literature on regional clusters is huge and varied, covering theoretical and methodological aspects for the explanation of the development and structure of clusters as well as a number of case studies and attempts to classify different types of clusters (overviews given by ENRIGHT 1996 and 2001, ANDERSON 1994). Regional clusters can be described as an agglomeration of enterprises of the same or functionally connected

sectors, that are characterised by interaction through supplier-relations, common use of technologies, common procurement, marketing or labour markets. They can develop either around large enterprises through outsourcing and the local establishment of suppliers, services and processing firms, as a network of SME's characterised by vertical or horizontal co-operation, or around universities and research institutes through direct or indirect spin-off's (MARKUSEN 1996, RÖSCH 1998).

Today we find a multitude of theoretical concepts to explain the development of regional clusters, ranging from concepts that go back to traditional theories - industrial districts and the product-life-cycle - to relatively new concepts based on evolutionary and institutional economics or transaction analysis, such as the concepts of flexible specialisation, social construction of local labour markets or regional networks and milieu-oriented concepts. These concepts represent different viewpoints and partial explanations of the same complex phenomenon, but yet we lack a general view of their relevance and the relations between the different concepts. To analyse the significance and the interactions of the different aspects that influence regional clusters, a combination of the partial viewpoints is needed (STERNBERG 1996: 535).

The research project is based on three conceptual levels, that refer to different theoretical concepts of regional clusters as:

1. a functional entity, based on a localised production system,
2. a social, cognitive entity, based on the local/regional milieu (local economic, organisational and institutional environment),
3. a spatial entity, based on physical, architectural and cultural factors of the region.

As regional clusters are not isolated systems, but characterised by a mixture of regional, national and international interactions, different spatial levels of business relations and institutional frameworks have to be considered (GRABHER 1993, MAILLAT 1998). Entrepreneurial relations cover material as well as immaterial transactions and contacts, such as supply, investments, services, information and knowledge. They include market relations, co-operations and network relations that can be short-, medium or longterm. Relevant actors within regional clusters are entrepreneurs as well as public organisations, public-private-partnerships, private initiatives, professional institutions and NGO's with their institutional arrangements.

Moreover, entrepreneurial relations are subject to permanent change: They can be expanded (quantitative, spatial), changed, adjusted, loosened, etc. With a growing market position and establishment of an enterprise or a product and with the technological development and diversification of products and services, the relations towards suppliers, clients and co-operating partners tend to be altered. According to STORPER (1997) and WINDRUM & BIRCHENHALL (1998), the significance and intensity of enterprise relations is mainly affected by the organisation and standardisation of the production processes and product development, the degree of specialisation and the availability of specialised, implicit knowledge. Whereas new or derivative products, young markets and enterprises tend to be characterised by intensive immaterial relations (STORPER'S *untraded interdependencies*), material relations and transactions become increasingly important with a growing establishment and standardisation. The degree of regional orientation and relations of firm, their regional embeddedness, is depending on how sensitive this relations react on time and distance.

#### **4. Methodology and Data Basis**

The project is based on three regional case studies: Hamburg, Dresden-East Saxony and the "TechnologieRegion Karlsruhe". Whereas Hamburg is one of the major agglomerations in Germany and a cluster for traditional media, advertising and so called new media (Internet-, Multimedia-agencies), Karlsruhe has developed as a center for software engineering and Internet-software programming mainly fostered by regional universities, colleges and research institutes. Dresden represents a younger cluster with a focus on microelectronics and semiconductors that emerged from the research and product basis of the former GDR and got an important push after the German unification through the location of two large microelectronic sites by Siemens/Infineon and AMD. Thus, the three clusters are different concerning:

- a) the starting point (traditional sectors in Hamburg, research infrastructure in Karlsruhe, know how, labour force and political intervention in Dresden)
- b) size (i.e. number of enterprises, employees and spatial extension),
- c) the stage within the development process of regional clusters, and
- d) the specialisation within the Information Economy (traditional and new media with a focus on content in Hamburg, software in Karlsruhe and hardware in Dresden).

The three regions have been chosen to analyse, if regional embeddedness varies between the three subsectors of the Information Economy. To what extent do the size and the age of a cluster influence the form and intensity of local ties? And which consequences do the nucleus and the resulting development process of a cluster have on the regional embeddedness of the enterprises?

The project follows an actor-oriented approach combining two steps of empirical analysis:

- 1) interviews with representatives of IE-enterprises as the main actors, based on a semi-standardised questionnaire;
- 2) expert-interviews, representing the organisational and institutional milieu of the region.

The questionnaire covers supplier-, client-, service-, labour-, interfirm- and personal as well as institutional network-relations and is completed by a valuation of the regional conditions and milieu. Subjects of the expert interviews are the specific focus, programmes, projects and services of the organisations and statements on selected results of the enterprise-interviews.

Table 3.1: Sectoral Structure of the Samples

Sector within the IE	Hamburg		Dresden		Karlsruhe		Total	
	No.	%	No.	%	No.	%	No.	%
<b>Software</b>	12	<b>21</b>	14	<b>27</b>	20	<b>46</b>	46	<b>30</b>
<b>Hardware</b>	2	<b>4</b>	10	<b>19</b>	3	<b>7</b>	15	<b>10</b>
<b>Telecommunication, Internet Service Provider (ISP)</b>	4	<b>7</b>	4	<b>8</b>	1	<b>2</b>	9	<b>6</b>
<b>Traditional media, agencies</b>	14	<b>25</b>	7	<b>14</b>	3	<b>7</b>	24	<b>16</b>
<b>Print- and photo sector</b>	4	<b>7</b>	6	<b>12</b>	9	<b>21</b>	19	<b>13</b>
<b>Advertising, Marketing, Design</b>	8	<b>14</b>	9	<b>17</b>	2	<b>5</b>	19	<b>13</b>
<b>Internet, Multimedia, Online - Services</b>	12	<b>21</b>	2	<b>4</b>	6	<b>14</b>	20	<b>13</b>
<b>Total</b>	56	<b>100</b>	52	<b>100</b>	44	<b>100</b>	152	<b>100</b>

The data base for the enterprise-interviews was provided by the regional Chambers of Commerce. Adresses were selected according to the relative importance of the sectors in the region and followed two steps: First, important key-enterprises were selected for each region, and in the second step, the samples were completed by a random selection. Altogether, 512 enterprises have been asked for an interview. With 152 valid interviews the response rate varies between 27% in Hamburg and 33% in Dresden. More than two thirds of the interview partners belong to the management or executive board of the company or the local site. About 70% of the sample are single firms, one third of the enterprises have multiple locations. The sectoral structure of the three samples represents the regional specialisation within the IE (Table 3.1). A major sectoral bias due to selective responses cannot be observed.

## **5. Results**

The results presented are preliminary, as the project is still in progress and the analysis of both empirical steps ongoing. The paper concentrates on selected aspects of regional embeddedness with references to comparative studies of other sectors or regions. The chapter is structured along the selected aspects and main research questions.

### **5.1 General characteristics of the IE-enterprises**

The interviewed firms are mainly young SME's, established during the last ten years (70%) and employing up to 100 persons (85%). However, regional differences can be observed. The Hamburg sample is a mixture of younger firms and traditional, large companies mainly within the media sector, whereas Karlsruhe is clearly dominated by SME's. The Dresden sample comprises a large number of very small and young enterprises, predominantly founded after the German unification, and a few large hardware firms.

The majority of the enterprises have been founded within the region (85%) and even more have established their (national) headquarter there (90%). Most of the entrepreneurs also have local roots. The Dresden sample also includes a number of firms that are co-established by west-German entrepreneurs. The number of enterprises with regional origin is lowest within the hardware, telecommunication and ISP sector, which mainly belong to multinational companies.

Whereas most of the enterprises in Dresden and Karlsruhe are new establishments, significantly more firms in the Hamburg sample are spin-off's from media or advertising companies within the region. Moreover, it also has the largest number of spin-off's from interviewed firms. These findings can be explained by the age of the cluster and the existence of large companies that try to diversify by the establishment of business units within the new media sector. In contrast, Karlsruhe and Dresden are relatively young clusters dominated by SME's that don't have similar tendencies of diversification. Quite obviously, spin-off's tend to be located in proximity to their nucleus due to strong business relations, joint projects, the exchange of knowledge and information, the use of infrastructure and services, and the local roots of their employees.

## 5.2 Economic and spatial connections of the IE firms

As **supplier-relations** are relevant only in the hardware sector, the paper won't go into details of this aspect. Local suppliers are of main importance for the hardware production process, so that supplier-firms are forced to locate close to the production sites.

On the other hand, **client-relations** play an important role for almost every subsector within the IE. With only few exceptions, the interview partners emphasised the intensity of their client-relationships. For the larger enterprises this is at least relevant concerning their major clients. Intensive client-contacts do not necessarily afford proximity, but they can also be held up over distance by telephone, E-Mail and Fax. However, there are remarkable differences in the estimation of proximity between the sectors. In the advertising, design, print, software, telecommunication and Internet service providing (ISP) sector, short distance to clients does make a difference. These sectors are more concentrated on regional markets and have the highest share of regional clients. Telecommunication- and ISP-firms are bound to their infrastructure, and client-orientation and services are the main instruments for distinction within the highly competitive market, where price and technology do not vary much. The interview partners pointed out, that their clients look for quality of service, personal contact, assistance and 24-hour-service, which affords local presence. Also Software firms emphasised the advantages of short distance due to the frequency of client contacts for individual software programming, adjustment and consultancy. Larger software companies, operating on a (inter)national level, tend to open regional offices to limit



travel costs and time for client-services. In the advertising-, print- and design sector the need for direct face to face-contacts derives from the frequency of client contacts, the visual impression of the products, short-term ordering and trust, calling for proximity.

The importance of proximity is even more expressed for **services**. Almost every enterprise (92%) demand services (such as attorneys, consultants, software-, hardware- or other specialised services). 83% of the interviewed firms use to have exclusively or predominantly local service relations. There are minor regional differences, varying between 86% in Hamburg and 79% in Dresden. These variations might be a result of the potential of service partners due o the size of the region. Differences between the sectors can be observed, but they are not statistically significant: Telecommunication firms tend to have less local service partners (56%), whereas the sectors software, hardware and traditional media have the highest rates (86-88%). Moreover, the bigger the enterprise, the more national or international service relations are maintained, but these tend to be rather specialised and less frequently needed. Asked for the importance of proximity, 59% of the interview partners find it (very) important, that service partners are present locally in order to guarantee flexibility and a 24-hour-service. Another aspect that calls for local services is trust because of sensitive data that, for example, consultants and attorneys get. Of all relations analysed in the project, services are most explicitly claimed for on a local level.

Another important aspect is the share of **regional labour force** within the firms. According to the average share of regional employees, enterprises in Karlsruhe have the highest local labour relation (79%), and Hamburg the lowest (69%). Significant differences between the three regions can be observed: In Dresden, a remarkable number of firms employ exclusively local labour force, whereas nearly every second enterprise of the Hamburg sample has less than 50% regional employees. These variations can be explained by the regional supply of qualified staff and differences concerning the attractiveness for external labour force. Although the dominant sectors in Hamburg find a large and well qualified supply of employees within the region, interview partners stated that they would also have no problems to recruit external qualified staff and "high potentials". This is much more difficult in Dresden and Karlsruhe due to their size, image and "urban flair". Representatives of the dominant sectors in Dresden and Karlsruhe also complained about a current regional bottle-neck

for qualified staff, mainly forced by a few larger and well-known companies that offer higher wages and better career-opportunities. One of the main advantages of Dresden-East Saxony, the supply of qualified technical staff, apparently has changed into a lack of young professionals due to labour migration to West-Germany and the active recruiting by saxonian as well as west-german enterprises. At least interview partners from SME's complained about the difficulties to recruit regional university and college graduates. Even qualification and retraining programmes offered and sponsored by public labour administration could not match the need of the IE sector. The interview partners claimed, that the staff would not be sufficiently qualified and suitable. Even if the employment of (re-)trainees is financially subsidised, the time and costs for job-integration have been estimated as not adequate.

**Co-operations with reseach institutes** tend to depend from both the research intensity of the products or services and the research affinity of sectors (KOSCHATZKY 2001: 143). GRUPP and SCHMOCH (1992) showed that research relations can differ significantly between sectors due to the maturity of the technology and the availability of specialised, implicit knowledge. Moreover, enterprises with research and development (R&D) capacities tend to have more research-cooperations than enterprises without R&D (ARNDT 1999, SIVITANIDOU 1999).

These findings can at least partly be verified for the german IE sample. Within the sample, hard- and software firms have the highest share of R&D-capacities, whereas the sectors traditional media, advertising and print are significantly less research-oriented. Moreover, 75% of the enterprises with in-house R&D co-operate with universities or research institutes. However, these general findings cover significant regional and sectoral differences. Although only every third firm of the Hamburg sample performs R&D, more than 50% of the enterprises have had research co-operations. In contrast, 50% of the enterprises in Karlsruhe perform R&D, but only 43% of them co-operate with research institutes. The interviews and individual answers show, that in Hamburg far more enterprises without R&D co-operate with research institutes - predominantly within the traditional and new media sector. These firms do not have either the need or the capacity for R&D-departments. Thus, research partners are not a complementary partner within a joint project, but a substitute for lacking in-house capacities. The

activities tend to be projects, e.g. for specific software tools or market studies, or institutionalised contacts for teaching, student-jobs and recruiting of university graduates.

The Dresden and Karlsruhe samples confirm the high R&D-affinity of the hard- and software sectors which predominantly perform both in-house R&D and research co-operations. In Karlsruhe, almost every enterprise with own R&D has research co-operations, whereas far less firms without R&D have co-operated. In Dresden, similar to Hamburg, every second firm without in-house R&D has co-operated with research institutes. These are mainly small and young firms who don't have the capacities and the need for continuous R&D, so that they rely on partners when needed.

Chart 5.1: Number of most important research-partners within the region

Asked for the location of the three most important research co-operations, enterprises in Dresden-East Saxonia show a clearly greater affinity to regional research institutes than their counterparts in Hamburg and Karlsruhe (Chart 5.1). 97% have at least one partner in the region, and even the others are predominantly situated either in Saxonia or East-Germany. Only the large microelectronic sites co-operate with national or international research partners to a greater extent, but simultaneously they have strong connections to regional universities, colleges and research institutes. These findings correspond to the results of a study on the spatial range of knowledge transfer from research institutes. According to BEISE and STAHL (1999), east german enterprises use to co-operate more frequently with regional institutes than west-german enterprises. Not only the large microelectronic enterprises, but also many SME's searched for proximity to research sites, because they rely on the access to qualified staff, "the specialised knowledge is located there" (interview partner from software sector), due to "an intensive exchange and use of the technical infrastructure" (interview partner from hardware sector) or "to maintain personal contacts" (interview partner from software sector). Thus, proximity to research and education facilities is perceived as one of the main advantages of the region Dresden-East Saxonia.

Chart 2: Fields of research co-operation (multiple answers)

The enterprises in Hamburg and Karlsruhe show less regional orientation for research co-operation. Interview Partners in Hamburg often claimed, that no suitable partner would be situated in the region or that proximity was no major concern. This correlates with a significantly less positive perception of the regional research- and education- infrastructure. For the case of Karlsruhe the moderate regional orientation in research is more astonishing, considering the high estimation of the regional R&D-facilities that was acknowledged by the interview partners. However, compared to Hamburg the enterprises more often have two or three of their most important partners in the region. These co-operations are mainly project oriented and comprise student jobs within the firm or teaching jobs in the local universities and colleges (Chart 5.2). The relationships tend to be quite strong on the personal level relying on a continuous and close knowledge-exchange.

Chart 5.3: Spatial distribution of interfirm co-operations (average rates)

**Interfirm co-operations** play an important role for the IE-enterprises. 85% of the interviewed firms have had interfirm co-operations within the last three years. The regional variations are minimal (see Chart 5.3). However, the average share of regional co-operations is significantly different, varying between only 38% in the "TechnologieRegion Karlsruhe", 49% in Hamburg and 58% in Dresden-East Saxonia. Corresponding to the research co-operations, enterprises in the east-german region show the strongest regional orientation. But the image is more complex than this average indicator pretends. The Dresden-sample can be divided into two types of enterprises: a number of mainly large or medium size enterprises within the hardware sector with a mixture of (inter)national co-operations and minor regional orientation, and the large group of SME's that is relying on close interaction and co-operation with regional enterprises. Enterprises that serve the national market very often have completing co-operations with one or a few west-german firm(s) in order to get access to the west-german market. Co-operations more often focus on the exchange of knowledge and experience, whereas joint projects, common marketing and supply play a less important role compared to the enterprises in Hamburg in Karlsruhe (Chart 5.4).

In contrast, enterprises in the Karlsruhe region show a clearly national orientation concerning interfirm co-operations. Every second firm has no regional partner. As the enterprises tend to be highly specialised on market sectors or branches and the co-operations are often project-oriented, the spatial orientation might be an effect of this specialisation. Interview partners stated, that adequate project-partner could not be found in the region, but would be located elsewhere in Germany or in a foreign country.

Chart 5.4: Types of interfirm co-operation (multiple answers)

The enterprises of the Hamburg sample show a significant orientation towards market-, supply- and resource-oriented co-operations (see Chart 5.4). This is also an effect of the sectoral structure, because enterprises in the traditional and new media as well as in the software and advertising sector tend to co-operate for these reasons, whereas hardware enterprises are more focussed on strategic technological development projects. The enterprises in Hamburg often have a relatively balanced mixture of regional and interregional co-operations. However, asked for the location of the three most important partners, they have the highest share of regional partners, which apparently is an effect of the agglomeration offering a large potential of co-operation partners. Hamburg is one of the preferred locations for national headquarters or offices of (inter)national companies in Germany, so that co-operations can be performed with the regional office. Dresden and Karlsruhe offer less opportunities of that kind, even though in Dresden a process of office establishments can be observed triggered by the large microelectronic sites. However, they rather comprise suppliers and service providers, such as clean room technology, maintenance of machinery or suppliers.

According to the interview partners, proximity is no major criteria for interfirm co-operation. Other aspects, such as know how, specialisation, market position or trust and liability of their partner firm are more important. Proximity is a positive and enhancing factor, but no necessary condition for co-operation. If adequate partners can be found in the region, they are often preferred, especially in the new media and software sector.

**Personal and institutional networks** play a significant role for most of the enterprises within the sample. Besides well developed personal networks, the majority of the interview partners also participates in institutional networks such as professional

organisations, local business clubs or initiatives. However, the degree of participation varies between 71% in Hamburg and 57% in the "TechnologieRegion Karlsruhe" (Chart 5.5). For many entrepreneurs of the Hamburg sample, network activities belong to their day-to-day business. Within the media and advertising sector they have even been called "typical" or "necessary for making business". Networks - personal and institutional - are used for access to information, business contacts, informal client acquisition and for the observation of markets and technological development. Moreover, in Hamburg interview partners also pointed out, that they would get new ideas or feedback on projects through networks, resulting in a sectoral or regional "benchmarking" (interview partner from Internet-firm). For the interview partners in Dresden and Karlsruhe, these "creativity aspects" play a minor role. Instead, contacts and insider information have been named as the dominant advantages of networking.

Concerning the spatial range of network-contacts, significant regional differences can be observed. Whereas regional networks play an important role for the enterprises in Karlsruhe and Dresden, the IE-firms in Hamburg participate in national organisations more frequently. This is especially the case in the media and advertising sector with established sectoral organisations, whereas new media- and software-enterprises have successfully developed a new regional network. In Karlsruhe, where the number of regional networks is quite limited, networks are rather regionally concentrated. On the other hand, there are a number of enterprises without any regional network activities due to a lack of information or interest. In Dresden-East Saxonia the majority of the enterprises take part in both regional and national organisations, which might be an effect of the economic transition in East Germany. Networks have started to develop first after the unification, and many entrepreneurs search for regional contacts, information and support as well as for market information and orientation on a national level. The regional network structure is rather broad and distributed on many different, sometimes very small networks such as local business clubs and regional initiatives.

Chart 5.5: Participation in regional networks

The analysis of spatial relations has been completed by an estimation of the regional business conditions according to a list of 24 location factors. The resulting regional profiles are quite different. Least variations can be observed for the evaluation of the

aspects quality of information- and communication-infrastructure, proximity to services and suppliers and the availability of public organisations for consultancy and technology transfer.

Entrepreneurs of the Karlsruhe-sample showed the most moderate evaluation, providing no extreme results. According to the interviews, the most positive and negative locational factors for the "TechnologieRegion Karlsruhe" are listed below.

Table 5.1: Locational profile of the "TechnologieRegion Karlsruhe"

<b>Positive</b>	<b>Negative</b>
➤ proximity to universities and research institutes	➤ taxes and fees
➤ spatial location in a european context	➤ access to business capital
➤ accessibility	➤ public co-operation
➤ innovative milieu	➤ availability of qualified staff

Moreover, compared to Hamburg and Dresden, the factors proximity to enterprises of the IE, cultural amenities and regional network contacts have been estimated less positive, confirming that regional networks and business contacts are relatively limited and could be improved.

Hamburgs strongest advantages result from its diverse economic structure and quality-of-life factors (Table 5.2). Compared to Karlsruhe and Dresden, the interview partners most explicitly perceived the region as a creative and stimulating milieu. On the other hand, the climate for innovations was estimated less positive than in Karlsruhe. As creativity is mainly associated with design, arts, content and services, and innovation with technologies and products, these findings underline the perception of Hamburg as a cluster for content and services and "the german capital of internet and multimedia", whereas soft- and hardware are underrepresented. Besides the aspects taxes/fees and public co-operations, a comparative disadvantage of the region seem to be the research and education infrastructure. Interview partners from the media, software and design sector were most critical concerning the regional educational and research institutes. In fact, Hamburg provides a huge variety of public and private universities, colleges and schools within the media sector, but the variety is often perceived as too large and difficult to overview or the quality has been criticized. The ongoing discussion about a new

"Media-academy" is a mirror of the dissatisfaction expressed in the interviews. However, a rack of information and contacts to potential partners seems to be on eof the crucial points regarding research co-operations in Hamburg.

Table 5.2: Locational profile of Hamburg

Positive	Negative
➤ proximity to suppliers, services, IE sector and clients	➤ taxes and fees
➤ quality of life, attractive city	➤ public co-operation
➤ positive image	➤ regional universities and research institutes
➤ creative milieu	

Dresden is characterised by a number of disadvantages such as location, accessibility, the general economic situation, access to business capital and regional start-up activities. Positive aspects are the availability of business space and housing (quantity, quality and price) and quality-of-life factors such as cultural amenities, leisure and the regional landscape. Although interview partners often complained about difficulties to recruit qualified staff, the labour market was estimated better than in Karlsruhe. However, the general economic development of East-Germany, the lack of industries and the persisting image of East-Germany as "the looser in history" have been perceived as the major problem of the region. The development of the hardware-cluster in Dresden is a positive sign, but yet, many interview partners stated, that the large enterprises would only be "lighthouses" surrounded by firms that are quite isolated from the rest of the economy in (East-)Saxonia.

Table 5.3: Locational profile of Dresden-East Saxonia

Positive	Negative
➤ availability of business space	➤ access to business capital
➤ supply and quality of housing	➤ start-up activities
➤ quality of life	➤ location and accessibility
➤ regional universities and research institutes	➤ proximity to business partners

## 6. Summary: Regional differences and sectoral influences

The case studies do not confirm the image of the IE sector as footloose enterprises performing "remote business" with the help of modern ICT. Client- as well as service-



relations are important factors for location in almost every subsector. Business contacts, personal and institutional networks are additional aspects that may not be decisive for location, but - regarding the fact, that most of the enterprises remain in the region where they were established - they are crucial factors in the start up-phase, because they provide informational advantages and potential clients or co-operation partners. They also remain important for the development process of a firm, although they tend to be extended on a national or international level. In this context, Hamburg and Karlsruhe provide examples for the processes of self-organisation and network development for the emerging internet- and multimedia-sector where established organisations lacked or did not seem to offer adequate surroundings.

Regional and sectoral differences are interconnected to a certain extent. However, specific regional qualities can be extracted from the interviews. These are mainly locational as well as institutional and social aspects, such as the quality of life, the image of the region or city, the institutional milieu and the availability and quality of networks. The presence and the quality of educational and research institutes is an important, if not crucial factor for regional clusters. The interviews confirm the significance of this aspect for Karlsruhe and Dresden, illustrated by strong regional ties for research co-operations and recruiting of qualified staff. The research milieu is not only one of the roots of innovative enterprises, but also perceived as a supporting factor for business activities. This is much less the case for Hamburg, where regional ties for research co-operations are much weaker and a lack of adequate partners is expressed more often, sometimes only because entrepreneurs lack information and contacts to potential partners. On the other hand, Hamburg most explicitly provides a creative milieu for enterprises within the IE, whereas interview partners in Karlsruhe and Dresden rather point out an innovative milieu for technological development which is underlined by the character of network relations and research co-operations.

The case studies also document significant differences between the subsectors of the IE. Concerning clients, markets, services and co-operations, the strongest regional business orientation can be stated for the print, advertising, design, software and at least in part for the telecommunication sector. There, infrastructure and client-relations are the most significant factors for regional offices and markets, even though they often belong to (multi-)national companies. Hardware and Internet/Multimedia enterprises tend to have

less regional orientation concerning clients and interfirm co-operations. On the other hand, the Internet/Multimedia sector is characterised by vivid regional networks and regional recruiting of staff, which often relies on personal or institutional networks and contacts to local research and educational institutes. The hardware sector is characterised by a mixture of international markets, co-operations, strategic alliances and contacts as well as regional ties through suppliers, services and the use of research and educational infrastructure.

The paper does not go into details of influences of age, size, type or position of an enterprise, neither on the impact of the age, type or the development process of the specific cluster. These aspects provide further information for the understanding of IE-clusters in Germany, but remain to be analysed in detail.

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