Knowledge-intensive (business) services in Europe
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I Introduction

For a long time, innovation research basically concentrated on the manufacturing sector – in particular on high-tech industries – and technological innovation, while neither the service sector nor non-technological innovations were considered in detail. However, this situation changed drastically: both in science and policy, as interest in knowledge-intensive services (KIS) and in knowledge-intensive business services (KIBS) in particular grew over the last 15 to 20 years, as reflected in the number of publications. During this time, the perception of services shifted from adapters of innovation stemming from the manufacturing sector to important players in the innovation process, not only as individual innovating actors, but also by spurring on the innovativeness of their clients (Muller/Doloreux 2007: 19).

With regard to investigations aiming to provide a better understanding of innovative activities of KIS and KIBS, the basic difficulty is to measure innovation in services through suitable indicators. Usually used innovation indicators were basically developed for manufacturing and here specifically for technological innovation (cf. for instance the first edition of the Oslo Manual, OECD (2005: foreword)). However, these indicators only insufficiently display service innovation activities which are strongly related to competencies and knowledge, often have a high development component and are generally less formalized and separate from "daily work" (i.e. mostly no formal R&D, rather "development on-the-job", high importance of knowledge, skills and creativity, high consulting component, and so forth). So the main challenge is to better understand and measure the innovation activities of service firms. A further difficulty relates to the fact that a clear and non-ambiguous differentiation between manufacturing and service firms is increasingly difficult; manufacturing firms often sell services with their products and vice versa (Baines et al. 2009; Strambach 2008: 155/156). This phenomenon also leads to the situation that service activities are largely client-specific, they respond to specific needs and are thus related to the context in which they are delivered. Therefore, due to a high heterogeneity of services, an indicator-based comparative analysis on an international scale may hide specificities and potentials of service firms.

The comparatively recent focus on services with respect to innovation partly originates from efforts of western economies and the European Union to become knowledge-based economies. In this respect, the European Commission states: "The economic importance of services means that improvements in European living standards are likely to depend more and more on productivity improvements in business services than in manufacturing" (European Commission 2007: 7). This is related to the view that "[...] KIBS are likely to be one of the main engines for future growth within the European Union." (European Commission 2007: 7).

Horizontal as well as vertical political measures have been implemented over the last years. However, due to the relatively recent interest, policymakers are still on a learning curve. "Over recent years, the interest towards service innovation policy has been growing simultaneously with the growing economic weight and significance of services. At the same time, policies in support of services innovation have remained relatively underdeveloped in many Member States and regions" (EC Commission Staff 2009: 65).

In this general context, the general aim of this booklet is to give an insight into service activities in Europe, particularly in their spatial occurrence. Special focus is on the

- Regional context
  - Functions in the regional and extra-regional division of labour
  - Possible impact on the renewal of the regional techno-economic paths
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- Relationship of KIBS and clusters
- Investigating the spatial patterns of services and here basically knowledge-intensive services as well as knowledge-intensive business services and their relationships to regional income and other relevant aspects
- Describing policy responses (mainly at EU level)
- Deriving policy recommendations

The booklet is sub-divided into four chapters. The second chapter will focus on the scientific insights and debates regarding knowledge-intensive services (KIS) and knowledge-intensive business services (KIBS), a sub-group of KIS. Chapter 3 will provide insights into the KIS landscape in Europe with a particular focus on the regional level (mostly NUTS 2). Political responses at EU level, as well as in the Member States will be described in Chapter 4. Finally, building on the previous discussion, Chapter 5 will sum up the results and present the derived recommendations.

II Theoretical considerations of knowledge-intensive (business) services

As mentioned above, the scientific interest in service innovation is relatively recent, but research over the past years was able to provide a better understanding of their role. Innovation research in this context generally focuses on a particular part of the whole service sector, namely, so-called knowledge-intensive services or KIS whose activities have a high knowledge component. Of particular interest within this group are knowledge-intensive business services (KIBS), i.e. firms that provide knowledge-intensive goods and services for other business firms. Detailed definitions of these two (sub-) sectors in the light of statistical analyses are given below. This chapter will present the findings with regard to KI(B)S and innovation. In order to be able to assess empirical findings on KI(B)S patterns in Europe, it is necessary to consider the regional context in which they operate and their function in the regional and extra-regional division of labour, as well as their impact on the renewal of regional techno-economic paths. Finally, and based on the question whether knowledge-intensive (business) service firms show spatial patterns and possibly agglomerations, the relationship of KI(B)S and clusters will be examined.

Basic characteristics of KI(B)S

For knowledge-intensive services (KIS) – as defined by researchers – knowledge is the main production factor and the good they offer.

Knowledge-intensive business services (KIBS) build a sub-category of KIS that Strambach (2008: 156) describes by adding the following two points:

1. Cumulative learning arises from in-depth interaction between supplier and user (Muller/Zenker 2001).
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2. **Activity of consulting**, i.e. "process of problem solving in which KIBs adapt their expertise and expert knowledge to the need of the client".

Based on the KIBS sector and its role as a knowledge-producing, knowledge-using and knowledge-transforming industry, Strambach argues that KIBS's functions can be better understood by a more detailed analysis of underlying knowledge aspects, such as, for instance, the knowledge bases on which their services are based.

In this respect, a recent research analysis by Fraunhofer ISI confirmed the hypothesis that individual persons may fulfil crucial and significant functions in their service firms, boosting knowledge valorization and innovation. It was assumed that these persons have specific characteristics and act as "innovation catalysts" within KIBS. They have been described as "knowledge angels" (in analogy to business angels). A qualitative study in different European regions (Alsace, Baden-Württemberg, Paris, Barcelona) – complemented by two international case studies (China, Canada) – supported this hypothesis and also permitted the derivation of contextual specificities of these individuals and their specific functions (cf. Muller et al. 2009; Muller et al. 2010).

The demand for knowledge-intensive services seems to increase with the efforts of European economies to maintain their competitive positions through their development into knowledge-based economies. This is reflected in favourable employment figures. While total employment in the EU grew annually by 1.4 % on average, between 2002 and 2007, KIS employment grew by 3.8 %. Hence, without KIS, annual employment growth would have been only 0.3 % during this period. The high growth rates of KIS over the last years were mainly demand-driven. A set of interrelated factors can be identified to explain this trend (Dachs 2009):

- Specialized expertise is demanded to solve the manifold challenges involved in today's economic activities, i.e. the knowledge-intensity increased significantly.
- At the same time, a particular field of specialized expertise is not always required at the same level. This fact favours outsourcing activities that are infrequently demanded or can be provided more efficiently by an external provider, like marketing, travel management, or legal service companies.
- Increasingly, firms involve external partners in innovation processes. These partners are not only KIS firms, but open innovation approaches can be expected to open up opportunities especially for them.

These findings already point to the diversity of knowledge-intensive service firms, on the one hand, and the enormous (economic) potentials and opportunities these firms offer. Finally, although the analytical focus of this booklet is mainly on KI(B)S firms, it should also be considered that the competitive advantage of manufacturing firms increasingly stems from their ability to offer packages of goods and services (so-called servitization).

It can be expected that these trends will vary between KI(B)S sectors, depending on the level of specialization and innovativeness of KI(B)S sectors.

**KI(B)S and innovation**

In addition to their support for other actors' innovation processes, knowledge-intensive service firms themselves are frequently also engaged in innovation activities. Depending on their specific field of activity, service innovation may embrace new products and technologies (e.g. customization of software), new processes (e.g. new forms of delivering services), as well as new organizational types or marketing procedures. So service innovation is now integrated in the Oslo Manual for the collection and interpretation of innovation data:
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"The importance of innovation in the services sector and of the services sector’s contribution to economic growth is increasingly recognized…", OECD (2005: 38).

Compared to technologically oriented processes in the manufacturing sector, innovation in KIBS is shaped by certain specificities (Burr 2007; Tether/Hipp 2000):

- the human factor is of high importance,
- production and consumption are a simultaneous process,
- service innovations are of intangible nature, and
- service innovations are characterized by a strong connectivity to customers.

As production and consumption often take place simultaneously, differentiating between process and product within KIBS is often impossible. What is more, the degree of innovativeness of products depends on a client's adaptation. This fact causes difficulties in measuring the innovativeness of knowledge-intensive service firms. As Miles (2001: 110) points out: "Industry criticism of consultants – which is not infrequently encountered! – may not only mean that some service firms offer poor quality products (some certainly do). It may also reflect firms' difficulties in using these services in an informed way". That means if a customer does not take up an innovative idea, e.g. with regard to marketing, it cannot be considered an innovation. Thus, since the level of services’ innovativeness depends on the adoption of the innovation by the client, empirical measuring innovativeness of KIBS is not straightforward (Hipp/Grupp 2005).

There is a high diversity of innovation processes within the service sector. Or put differently, no distinct pattern of service innovation can be detected, but various innovation modes (cf. Kanerva et al. 2006: 11ff.; Miles 2001). The nature of innovation within KIBS is often project based, ad hoc, interactive, i.e. the human factor is the key factor. The high importance of human capital stems from the fact that knowledge is "embodied in people and embedded in networks" (Strambach 2008: 161), while R&D departments in the usual sense are rare among KIBS.

Innovative KIBS firms are challenged by the fact that services are hard to protect from imitation (Gallouj/Weinstein 1997: 553). The result is that intellectual property protection mechanisms in services differ from those in manufacturing (Howells 2001). Patents are rarely used, while copyright, on the other hand, appears to be very relevant for certain KIBS sectors (e.g. in architecture, cf. Miles (2001: 95)). In addition, trademarks are used to protect company brands. As such, trademarks do not directly imply innovative products. However, new names and new trademarks are often registered as product innovation. As the data of the Community Innovation Survey 2006 shows, innovative firms significantly use trademarks more frequently than non-innovative firms. However, in general, for knowledge-intensive service firms, other methods of protecting knowledge seem to be more significant. Being a member in professional associations is one way of documenting certain quality standards if professional accreditation is necessary. In addition, reputation and secrecy seem to be very important to establish trustful relationships in which knowledge can be transferred and shared (Miles 2001: 97f.). From a scientific point of view, however, these protection methods are hard to measure, thus challenging endeavours to evaluate and compare the degree of innovativeness of individual KIBS firms.

Regional context

Innovation research during the last decades proved that regional factors and endowments may have an impact on innovative activities of business firms, and that region-specific innovation modes can be detected (Commission of the European Communities 2007; European Commission 2001). Specifically referring to knowledge-intensive service firms, a high concentration of KIBS firms can be expected
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in core regions and urban centres, while peripheral regions probably lack a wide variety of specialized KI(B)S (Strambach 2001). In addition, further concentration tendencies are expected: over the last years, the spatial concentration of KI(B)S rose and further concentration is likely (Jennequin 2008). This can be explained by reinforcing processes of supply-side variables and market size. Empirical findings show that in regions with many KI(B)S firms, start-up activities of KI(B)S are more frequent: "... both the overall knowledge intensity of the regional workforce and the size of the regional market have a positive influence on KI(B)S start-ups" (Andersson/Hellerstedt 2009: 118).

Wood (2005) finds in a European study that regional patterns of KI(B)S differ, depending on the KI(B)S activity. Core city regions exhibit concentrations of marketing, advertising and service companies specialized in financial business. While computer services are also concentrated in prosperous regions, technical services on the other hand appeared to be tied to demand from manufacturing and other industries.

However, different innovation patterns in sub-sectors make further differentiation among KI(B)S necessary: in the Quebec region, Shearmur and Doloreux (2009) find different patterns of innovative activities among KI(B)S firms, depending on the KI(B)S sector in focus. In some cases, at first a decrease in innovativeness away from the centre was followed by an increase towards the periphery. This finding questions the relevance of localized clustering.

Functions in the regional and extra-regional division of labour

The findings on spatial patterns of KI(B)S hint to a spatial division of labour among KI(B)S firms which has been facilitated by technological innovation as well as liberalization and deregulation (Rodriguez/Camacho 2008: 26). While KI(B)S in core regions function as bridges, KI(B)S in peripheral regions are embedded within their environment (Koschatzky 1999). Especially big consultancies are based in metropolitan regions. However, their services are delivered at client's sites within the same nation and world-wide (Wood 2002). The different functions – measured in terms of external contacts and cooperation patterns – is analyzed for the example of Norway. Differentiated patterns and hence different roles of KI(B)S in different spatial environments are identified. While KI(B)S in the capital region have more innovation partners outside Norway on average than other KI(B)S firms, i.e. functioning as global pipelines, KI(B)S in peripheral regions are much more focused and thus embedded in the local economy (Aslesen/Isaksen 2010). In addition, the firm size of customers or the type of client seems to be decisive for the role of KI(B)S. As Muller and Zenker (2001) show, KI(B)S are important partners in innovative activities for SMEs and with their innovation-supporting activities contribute to the formation of specific characteristics of innovation systems.

Impact on the renewal of regional techno-economic paths

KI(B)S in core regions innovate by reinforcing clients' own capacities to connect to international business intelligence and methods, i.e. spur innovation (Wood 2005: 438). In addition, KI(B)S have an important impact on innovativeness overall: "In general, services innovation correlates quite well with overall innovation performance, as measured in the EIS [European Innovation Scoreboard] 2008. The different levels of innovation performance in Europe can be very well explained by the different roles that knowledge-intensive services are playing in the economies. [...] the relationship between the share of employment in KIBS and KIS is significantly and positively correlated with the innovation performance ratios attained by the various Member States" (EC Commission Staff 2009: 45). However, as Wood (2002: 1001) notes: "It is not clear how far the use of cities by large clients and consultancies as a base for their wider global activities enhances the general metropolitan milieu of innovativeness and adaptability, apart from encouraging the devel-
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opment of smaller consultancies themselves”. Put differently, KI(B)S seem to have a positive effect on innovation, but in general the spatial dimension is not fully understood yet. As services become increasingly tradable over distances (either by digitalization or by travel activities of employees), the location of innovative service firms may in the first place reflect the attractiveness of a place. As described above, human capital is the most important factor of KI(B)S, so that the location decision may often be oriented towards environments where skilled employees prefer to live.

Relationship of KI(B)S and clusters

Clusters, often defined as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example universities, standards agencies, and trade associations) in particular fields that compete but also cooperate" (Porter 1998: 197), are seen as drivers of regional growth and innovation. The relationship of KI(B)S and clusters can be analyzed in two ways: first, which role do KI(B)S play in clusters, and second, do KI(B)S firms build clusters mostly independently from manufacturing activities?

With regard to the first question, Smedlund and Toivonen (2007) analyze the role of KIBS in networks which form the bases of clusters. Within their analysis, networks are further sub-divided into production networks, development networks and innovation networks. In line with the different kinds of knowledge shared in these networks, the role of KIBS varies. In production networks KIBS provide the explicit knowledge needed to optimize inputs or to optimize the production process as such. Development networks benefit from tacit knowledge provided by KIBS and from their ability to convert tacit knowledge into explicit knowledge, and vice versa. In innovation networks, on the other hand, KIBS function as knowledge brokers between actors. The kind of knowledge they provide often has the form of potential knowledge. Thus they are actively engaged in the innovation process. So far, empirical investigations have not yet focused on this relationship comprehensively. Smedlund and Toivonen assume that it can be expected that KIBS are more important actors in clusters with focus on production and development networks than in innovation networks. This can be explained by the fact that innovation networks need much more specialized expertise. Hence, diverse KIBS firms will be needed and Smedlund and Toivonen doubt whether sufficient demand for many specialized KIBS within one innovation cluster will arise.

To answer the second question empirically, two analytical steps are needed: at first, the spatial patterns of KI(B)S firms needed to be analyzed. Secondly, if spatial concentrations are to be found, the nature of the external effects tying those firms together need to be explored, in order to conclude whether those firms benefit from co-location. For the case of Germany, Alecke and Untiedt (2008) explore the spatial concentration of manufacturing and service industries by utilizing the Ellison-Glaeser index.1 Among the 56 industries at 2-digit level there are some KI(B)S industries that show a significant level of concentration: water transport (rank 2), air transport (rank 5), insurance (rank 8), real estate activities (rank 12), recreational, cultural and sporting activities (rank 13), activities auxiliary to financial intermediation (rank 14), and R&D (rank 18). At the other end of the scale, the authors find post and telecommunications (rank 53). A high degree of concentration may indicate the existence of clusters; however, the high degree of spatial concentration both in water and in air transport can be explained by their linkage to infrastructure, i.e. harbours and airports. For the remaining industries, more detailed analyses and case studies are needed to explore whether those firms are linked to each other in value creation chains.

1 The index measures regional concentration of industries and controls for industrial agglomeration.
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Wernerheim (2010) also uses the Ellison-Glaeser index to investigate the tendencies of service industries to co-locate. He finds confirming evidence for this assumption in the examined Canadian regions. The investigated service firms appear to co-locate with other service sub-sectors as well as with manufacturing industries. At a four-digit level, especially computer systems design and related services appear to strongly co-locate, e.g. with architectural, engineering, and related services, employment services, investigation and security services, services to buildings and dwellings, as well as universities. Based on these findings of co-location patterns, Wernerheim (2010: 746) concludes that “if proximity matters, the policy design is more complex as it may need to target a constellation of matching industries”.

Research questions for the empirical investigation

The literature review and theoretical considerations both point to a variety of research questions concerning the distribution and activities of knowledge-intensive (business) services within European regions. The following questions help to investigate the spatial patterns of KIS and KIBs activities in Europe:

- At regional level, what is the contribution of KI(B)S to employment? Where are KI(B)S activities localized within Europe? Is the hypothesized core-periphery gradient identifiable?
- Which specialization patterns can be detected?
- Which are the most dynamic regions regarding KI(B)S employment?
- In which way is regional growth linked to KI(B)S? Are regions with high shares of KI(B)S wealthier than other regions?
- Which patterns of innovative KI(B)S firms are to be found?
- Are there differences among European regions regarding occupation patterns of staff within KIS firms?
- Is there a link between KIS and KIBS, on the one hand, and high and medium high-technology manufacturing firms on the other? Which spatial patterns are to be found?
- Which typology is appropriate to group regions according to KIS and other structural and industrial characteristics?

These questions will be dealt with in the following section.
III Empirical investigation of patterns of knowledge-intensive (business) services in Europe

As the theoretical considerations showed, KI(B)S are quite heterogeneous. In addition, although they play a significant role as innovators, grasping their innovativeness is not straightforward. In order to shed light on patterns of KI(B)S activities in Europe, this chapter will at first define KIS and KI(B)S for the empirical investigations and discuss aspects of data availability. In line with the research questions mentioned above, this chapter presents results on the contribution of KIS and KIBS to employment, spatial patterns of specialization and growth dynamics. It will then investigate whether co-agglomeration of KI(B)S and high-tech manufacturing firms can be found and which countries the most innovative service firms come from. Lastly, a cluster analysis helps to set up a typology that allows grouping the investigated regions with regard to KIS activities and structural as well as industrial characteristics.

Methodology and availability of KI(B)S data

The definition stated above needs to be linked with an industry classification to allow empirical investigations. Eurostat defines knowledge-intensive services (KIS) in its database "high-tech industry and knowledge-intensive services" based on NACE Rev. 1.1 as detailed below (table 1). This definition is derived from the OECD Frascati Manual (see Commission Regulation (EC) No 753/2004). In line with the above mentioned definition of knowledge-intensive business services (KIBS), Rubalcaba (2009) (cit. in EC Commission Staff 2009: 17) defines KIBS as a sub-set of KIS. While the subcategorization used by Eurostat is rather based on the content of the activity, the classification of KIBS focuses on the demand side, i.e. which services are almost exclusively demanded by business firms (see Annex).

<table>
<thead>
<tr>
<th>KIS</th>
<th>Knowledge-intensive high-tech services</th>
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<tr>
<td></td>
<td>• Post and telecommunications (64)</td>
</tr>
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<td></td>
<td>• Computer and related activities (72)</td>
</tr>
<tr>
<td></td>
<td>• Research and development (73)</td>
</tr>
<tr>
<td>Knowledge-intensive market services (excluding financial intermediation and high-tech services)</td>
<td>• Water transport (61)</td>
</tr>
<tr>
<td></td>
<td>• Air transport (62)</td>
</tr>
<tr>
<td></td>
<td>• Real estate activities (70)</td>
</tr>
<tr>
<td></td>
<td>• Renting of machinery and equipment without operator, and of personal and household goods (71)</td>
</tr>
<tr>
<td></td>
<td>• Other business activities (74)</td>
</tr>
<tr>
<td>Knowledge-intensive financial services</td>
<td>• Financial intermediation, except insurance and pension funding (65)</td>
</tr>
<tr>
<td></td>
<td>• Insurance and pension funding, except compulsory social security (66)</td>
</tr>
<tr>
<td></td>
<td>• Activities auxiliary to financial intermediation (67)</td>
</tr>
<tr>
<td>Other knowledge-intensive services</td>
<td>• Education (80)</td>
</tr>
<tr>
<td></td>
<td>• Health and social work (85)</td>
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<tr>
<td></td>
<td>• Recreational, cultural and sporting activities (92)</td>
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<th>KIS</th>
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<td>• Computer and related activities (72)</td>
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<td></td>
<td>• Research and development (73)</td>
</tr>
<tr>
<td></td>
<td>• Legal, technical and advertising (74.1-4)²</td>
</tr>
</tbody>
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Source: Eurostat¹, EC Staff Working (2009: 17f.)

Kanerva et al. (2006) report on the measurement and comparison of service innovation by 24 indicators from 7 themes, reflecting the main elements of service sector innovation performance: 1. human resources, 2. innovation demand, 3. technological knowledge, 4. non-technological changes (e.g. organizational innovation), 5.

² At NUTS 2 level, data is only available for 74 in total, i.e. the data also includes less business-focused or less knowledge-intensive services.
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sources of knowledge, 6. commercialization, and 7. intellectual property (cf. Kanerva et al. 2006). However, at the regional level, data availability will limit the analysis to a smaller set of indicators.

As mentioned above, service firms seem to make less use of measures to protect their intellectual property, as the data of the Community Innovation Survey 4 shows. While 20 % of innovative manufacturing firms applied for a patent, only 8 % of innovative service firms filed an application. However, if only innovative KIBS firms are regarded, the share is 12 %. Among the other IPR measures – registering designs or trademarks or claiming copyright – the picture only changes in the case of claimed copyrights (13 % innovative KIBS firms versus 5 % innovative manufacturing firms) (van Cruysen/Hollanders 2008: 24). However, the question is whether the use of copyright identifies computer software firms as opposed to KIBS firms in general (European Commission 2007: 15).

Hence, in this context, input indicators seem to be a better way to catch a glimpse of KIS innovation at regional level. But compared to manufacturing firms, most KIS firms do not run an R&D department, so that only a limited range of indicators remains. Consequently, the following analyses are mainly based on employment data. The data stems from the Regional Key Figures database and covers the regional level of NUTS 2. In addition, other indicators will be used, as will be detailed at the relevant points, for example, the cluster analysis integrates data on GDP, occupation patterns and education patterns, as well as R&D spending by the business sector.

Contribution of KI(B)S to employment

The importance of KIS grew over the last years, and KIS currently provide a high share of qualified workplaces in various European regions. Being based on the quartiles of employment shares in knowledge-intensive services, figure 1 highlights the share of regions with more than 39 % of KIS employees. It becomes obvious that, together with core and urban regions in central and southern European countries, regions in the UK, Sweden and Finland have the highest shares of KIS employment. At the other end of the scale, most peripheral regions in the New Member States have less than 25 % of employees in KIS firms.

Figure 1: Share of KIS on total employment (Quartiles, 2007)

Data source: RKF database/Eurostat

When focusing on the sub-sample of knowledge-intensive business service firms, the European pattern changes slightly (figure 2). Again, urban and core regions dominate the quartile with the highest shares. However, while regions in Finland and Sweden fall in the second or third quartile, core regions in the New Member States and southern Europe are represented in the top quartile. Capital regions
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in the New Member States seem to have attracted – either local or foreign – KIBS firms that contribute to employment at a level comparable to the other states. Remarkable examples are the regions of Prague, Bucharest, Bratislava and Budapest. It can be expected that the regions of Warsaw and Sofia do not fall into this category due to their size. This means that since these regions cover a wider space, the high concentration of KIBS employees in the city centre may lose importance relative to the number of employees in other sectors working in the outskirts. However, a more granular analysis would be needed.

Figure 2: Share of KIBS on total employment (Quartiles, 2007)

Data source: RKF database/Eurostat

With regard to total figures, capital regions in France, Spain, the United Kingdom, the Netherlands and Germany still dominate. Figure 3 shows the absolute employment figures and the average growth rates between 2002 and 2007. Of course, total figures depend on the size of the region. The region of Paris has the highest number of KIS employees with more than 2.3 million persons.

Figure 3: NUTS 2 regions with the highest figure of employees in KIS (in 1000, 2007) and compound annual growth rate 2002-2007 (CAGR in %)

Data source: RKF database/Eurostat

Over the last years, KIS employment grew slightly in the region of Paris. Among the 15 NUTS 2 regions with the highest employment figures, Andalucía realized the highest growth rates with 8.1 % over the five year period between 2002 and 2007.

The region around Paris remains number one, if absolute employment figures in knowledge-intensive business service firms are considered, followed by Madrid and Inner London (figure 4). Paris and
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Rhône-Alpes are the only two among the top 15 regions which lost KIBS employment between 2002 and 2007. All other top 15 KIBS regions gained in KIBS employment, especially Madrid and Lisbon, with an average growth rate of over 10 % per year.

Figure 4: NUTS 2 regions with the highest figure of employees in KIBS (in 1000, 2007) and compound annual growth rate 2002-2007 (CAGR in %)

Data source: RKF database

So far, none of the capital regions of the New Member States is represented among the top regions with regard to total numbers of KI(B)S employment.

Spatial pattern of KI(B)S specialization

The fact that absolute figures of KI(B)S employment partly depend on the size of the regions leads to the question, which European regions show the highest agglomeration of KIS employment, measured in relative terms. The localization quotient (LQ) helps to answer this question: For a given industry, it measures the extent to which a region is more specialized in an industry compared to the geographical reference area. In this study, localization quotients are computed, based on all EU 27 NUTS 2 regions (compared to the European average). Localization quotients smaller than 1 signify that the region is not specialized in the given industry, while values higher than 1 signify a certain level of specialization. The value 1 means that the employment share of an industry within one region is the same as in the whole area. It is important to note that the localization quotients of ubiquitous industries have a lower range than those of particularly localized industries.

In order to get a detailed picture of the spatial patterns of regional specialization of KIS activities, the following figures focus at KIS sub-categories.

Figure 5 shows the pattern of specialization with regard to knowledge-intensive high-tech services (post and telecommunications, computer and related activities, research and development). High levels of concentration can be found in capital regions – interestingly, in old as well as in New Member States. Besides the southern part of the United Kingdom, Stockholm, Prague, Madrid, the Danish capital region (comprising Copenhagen and Bornholm) and the Bratislava area have location quotients > 2. Further European (capital) regions also show above-average location quotients, i.e. are highly specialized in computer-related activities, telecommunication services and research and development.

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4 A map of all KIS is displayed in the annex.
If knowledge-intensive market services – i.e. water and air transport services, real estate activities, renting of machinery, equipment, personal and household goods, and other business activities – are regarded (figure 6), the picture changes slightly. Inner London, Hamburg and Åland have localization quotients > 2, are thus the most specialized European regions in this service category. Capital regions in the New Member States no longer come into the category with the highest values.

With regard to knowledge-intensive financial services, the core-periphery gradient is even more pronounced (figure 7). Financial services seem to be agglomerated in the centre of Europe. Again, regions with high concentrations are capital cities as well as financial centres.
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Figure 7: Localization quotient knowledge-intensive financial services (2007)

In this respect, various European regions have quotients > 2. These are – not surprisingly – the most important European financial centres and their surrounding NUTS regions: Luxembourg, London, Essex, Darmstadt (which covers the city of Frankfurt), Province Luxembourg (B), eastern Scotland, Vlaams Brabant, Outer London, Surrey, east and west Sussex. In the New Member States, localization quotients > 1.25, thus a high specialization compared to the European average, can be found in Cyprus, Prague, the Bratislava area, Masovia (Warsaw) and Malta.

Regional growth dynamics of KI(B)S

In addition to the spatial pattern of KIBS in Europe and their specialization patterns, this chapter will take a closer look at the growth rates of this particular type of firms across European regions. As a reference, the annual growth rates of employment in the period 2002-2007 of all NACE groups will first be analyzed (see figure 8). It can be observed that the majority of European NUTS 2 regions showed average annual growth rates between 0-3 %. This was the case for most of the densely populated regions in the UK, France, Germany, Belgium, the Netherlands, Italy and Austria, as well as for all regions in Finland, Sweden, the Baltic states and Greece. Particularly high growth rates of 3 % and more can be observed in nearly all Spanish regions, Ireland and a few regions in the southern and south-eastern part of Germany (Freiburg, Niederbayern, Oberpfalz), in France (Provence-Alpes-Cote-d'Azur, Basse Normandie), and Cyprus. A particularly weak average annual growth rate or even a decline in employment was assessed in most of the Romanian regions, Bretagne, a few regions in the eastern part of France (Lorraine, Franche-Comté) and Upper Bavaria.
Knowledge-driven clusters in the EU

Figure 8: Compound annual growth rates (CAGR) of all NACE classes (2002-2007)

Having described the regional structure in employment growth for all NACE groups, the following map (figure 9) illustrates the employment growth rates in the same period for KIS. Compared to the reference analysis, the KIS employment pattern differs significantly. Although all Spanish regions and Ireland are still among the most dynamic regions (with growth rates above 3%), KIS growth obviously occurs also in a wide range of peripheral regions, like Sicily, Sardinia, Aquitaine, Midi-Pyrénées, Limousin, and many other scattered regions in Germany, Greece and the United Kingdom. Among the core regions of Europe, northern Italy deserves to be mentioned,

showing also a quite dynamic KIS employment pattern. On the other hand, quite a few regions in Romania and eastern France (again Lorraine and Franche-Comté) show a declining KIS sector with growth rates below 0. To subsume, the comparison of KIS and all NACE employment growth implies a positive correlation between overall economic growth – measured in employment growth – and KIS growth. Thus, the KIS sector can certainly be considered as an important driver of employment growth.

Figure 9: Compound annual growth rate (CAGR) of knowledge-intensive services (2002-2007)

Data source: RKF database/Eurostat

5 For Belgium average (2001-2003)
Finally, a focus on the employment dynamic in the sub-sector of KIBS completes this part of the structural analysis. Remarkably, the observation that the overall group of knowledge-intensive services are growth drivers, even in the majority of peripheral regions, can be confirmed for the KIBS sector as well, not to say that for the KIBS it is even more pronounced. This applies particularly to nearly all French regions, with growth rates reaching more than 5%. Likewise, many regions in the southern and eastern parts of Germany, Austria, UK, Greece, Italy and also Romania, Poland, the Baltic states and Finland show a very dynamic growth in employment.

On the other hand, many core European regions in Germany, the Netherlands, Belgium, parts of the UK and particularly in Sweden, are characterized by lower growth rates, however still reaching 3%. Nevertheless, only a few core regions show a decline in employment. The reason for this phenomenon may be a higher employment level in the KIBS sector in general, resulting in lower growth rates (level effect). Furthermore, a relocation of standardized or less specialized services to the periphery of the core regions or even to eastern European regions may also be an explanation for lower KIBS dynamics in the core regions.

Comparing these results with the information provided by the European Cluster Observatory (Europe INNOVA 2009) shows that growth comparisons depend very much on time horizon and/or sector definition. The Cluster Observatory defines knowledge-intensive business services more broadly than this report. Accordingly, regions with highest annual growth rates between 2001 and 2006 are Steiermark (22.4%), Estonia (19.7%) and Lithuania (15.5%) followed by three other Austrian regions. While Austrian regions indeed show good growth rates according to RKF data, they fall behind catching-up regions in Rumania, Portugal, Lithuania and France. That means prudence is necessary with regard to sectoral split and timeframes considered to evaluate the results. In order to fully understand growth trends, analyses in sectoral sub-categories – as provided by the various splits in this report – is advisable. Nevertheless, high growth rates of KIBS activities over the last years can be observed in both reports.

As pointed out above, knowledge-intensive services, particularly knowledge-intensive business services, are obviously important growth drivers in different types of regions. The following part of
the analysis focuses on the correlation between KIS and regional wealth, assuming a relationship between these two indicators.

Figure 11 and figure 12 show the interrelation between regional GDP (per capita in purchasing power parities) and employment share of KIS and KIBS in European regions.

Data source: RKF database/Eurostat

The correlation analysis resulted in a coefficient of 0.68 for the KIS/GDP relationship, and of 0.70 for KIBS/GDP. In both figures a positive correlation between regional growth and KI(B)S employment can be noted. With the exception of a few outlying regions showing a significantly high GDP per capita and an above average KIS employment share, most of the regions have KIS employment shares between 20-40 % and per capita GDP of between € 10k and € 30k. Although it is not possible to detail the causalities between GDP and employment in knowledge-intensive services, the analysis could prove high relationships between high-grade service employment and regional wealth.

Figure 12: GDP per capita (in PPP) and employment share of KIBS (2007)

Data source: RKF database/Eurostat

Patterns of innovative KI(B)S firms

Looking at employment data does not answer the questions about the business landscape behind these figures. There could be many small companies or only a few big ones. What is more, the degree of innovativeness remains obscure. An empirical analysis of innovation activities at the level of knowledge-intensive service firms in Europe, however, is faced with severe data gap difficulties, even more so at the regional level; available statistics do not allow us to draw a comprehensive and comparable picture of knowledge-intensive services and their innovation activities throughout European regions. Therefore, the following analyses focus on the national level.
Table 2 provides an overview of innovative activities and compares manufacturing with service firms. The data stems from the Community Innovation Survey 2008. The data refers to the following industry categories:

- All core NACE activities related to innovation activities (Innovative NACE classes) composed of B, C, D, E, G46, H, J58, J61, J62, J63, K and M71 (NACE Rev. 27)
- Manufacturing composed of C (NACE Rev. 2)
- Innovation core services activities (Innovative services) composed of G46, H, J58, J61, J62, J63, K and M71 (NACE Rev. 2).

The CIS results displayed in the first column of table 2 apply to any kind of innovative activities of firms. More specifically (columns 2 and 3), the focus is on firms with either technological or non-technological innovation (i.e. organizational and/or marketing innovation). Results for firms with both kinds of innovative activity are not displayed.

In general, there is a big variance with regard to innovative activities. German firms have the highest share with almost 80%. In most countries the share of innovative manufacturing firms is bigger than the share among innovative service NACE classes, except for Portugal, Hungary and Luxembourg.

Looking at technological innovation, innovation is more common in manufacturing firms than in service firms in all countries. Service firms from Estonia reach the highest share with 15.7%. However, if only non-technological innovation is considered, service firms dominate in almost all countries. In this case, the Czech Republic has the highest share with over 20%.

Table 2: Innovative activities at national level in % (2008)

<table>
<thead>
<tr>
<th>Country</th>
<th>Innov. NACE classes</th>
<th>Manufacturing</th>
<th>Innovative services</th>
<th>Innov. NACE classes</th>
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Source: Eurostat (Community Innovation Survey 2008)

As the debate on political support for KI(B)S in Chapter 4 will show, KI(B)S find it hard to benefit from public support for their innovative activities. CIS 2008 provides evidence for this argument.

7 NACE revision 2 partly diverges from revision 1.1.
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As table 3 reveals, if only firms are considered that pursue technological product or process innovation, a clear difference between manufacturing and innovative service firms emerges. In only one country, Portugal, is the share of service firms which receive public funding bigger than the share of manufacturing firms.

Table 3: Enterprises that received public funding for innovative activities (2008)*

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<tr>
<td>Finland</td>
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</table>

Source: Eurostat (Community Innovation Survey 2008)

* Not all countries are covered with regard to this question.

However, in order to obtain an indication of European service innovation, the following short analysis refers to the European R&D Investment Scoreboard and uses a selection of business classes as proxy indicators, albeit at the national level. This scoreboard annually lists the most important R&D-investing companies throughout the European Union and externally, thus mirroring the main investors in research and development which can be used as indicators of innovation input efforts. Not only is the home nation of these most important R&D investors listed, but also the main field of business activity of these companies. Besides various fields in the manufacturing sector, the scoreboard also includes some activity fields that basically consist of knowledge-intensive service firms. These business fields have been selected and are presented below.

The most recent 2010 EU Industrial R&D Investment Scoreboard issued by the EU Joint Research Centre informs about the top 1,000 EU companies investing in R&D in 2009. Besides the main criterion – the volume of companies' R&D investments – the scoreboard also contains various further indications concerning the top R&D investing companies. Table 4 groups them by country and selected knowledge-intensive service sub-sectors. In absolute terms, the UK dominates with almost 80 firms, followed by Germany and France. So far, with a few exceptions, firms from New Member States are rare in the ranking.

9 The scoreboard does not refer to the NACE classification, but to the Industry Classification Benchmark (ICB). The selected business activity fields are therefore not fully compatible with the NACE classes utilized in this booklet.
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Table 4: KI firms in the "EU Industrial R&D Investment Scoreboard - 2010"

<table>
<thead>
<tr>
<th>Country</th>
<th>KI high-tech services</th>
<th>KI market services</th>
<th>KI financial services</th>
<th>Sum KIS</th>
<th>Share of all national Scoreboard firms (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Belgium</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>1</td>
<td></td>
<td>1</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>4</td>
<td></td>
<td>3</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Denmark</td>
<td>7</td>
<td></td>
<td>7</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>21</td>
<td>5</td>
<td>5</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td>Germany</td>
<td>23</td>
<td>4</td>
<td>14</td>
<td>41</td>
<td>20</td>
</tr>
<tr>
<td>Greece</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Ireland</td>
<td>4</td>
<td>1</td>
<td>6</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>4</td>
<td>1</td>
<td>6</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>UK</td>
<td>32</td>
<td>29</td>
<td>17</td>
<td>78</td>
<td>32</td>
</tr>
</tbody>
</table>

Data source: EU Industrial R&D Investment Scoreboard

Table 4 also allows the share of firms that belong to the main European R&D investors in the selected KIS fields to be deduced. While the larger EU members Germany, France, the United Kingdom, Spain and Italy have less than 35% of the "top R&D investors" in the selected service fields – thus pointing to the high importance of manufacturing fields of activity concerning R&D expenditures – Bulgaria, the Czech Republic and Poland (as well as Portugal) have 50% or more of their top investors in those service-oriented fields of activity.

Occupation patterns of staff within KI(B)S firms

A further step towards a deeper understanding of knowledge-intensive service firms and their specificities in European regions is provided by the analysis of occupational patterns of service firms' personnel. Specific focus in this section is the share of personnel with scientific and technical occupations. Generally, and referring to industrial sectors as a whole, the vast majority of European regions employ 15% of their staff in scientific or technical occupations. However, as figure 13 depicts, the pattern in KIS is quite different, which will be shown in detail.

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10 Computer services, fixed line telecommunications, internet, mobile telecommunications, software.
11 Media, support services.
12 Banks, life insurance, non-life insurance, other financials.
13 Based only on a small number of firms.
Knowledge-driven clusters in the EU

Figure 13: Share of scientific and technical staff as well as other occupations – KIS 2007

Data source: RKF database/Eurostat

Figure 14 shows the share of scientific, technical and other personnel in European NUTS 1 regions in the year 2007, comparing the personnel structure in KIS to all NACE classes. The boxes are defined by the respective minimum and maximum values in both groups considered, and also refer to the average and median values. Three main aspects become obvious in this presentation: first of all, the range of shares for scientific and technical personnel is much higher in KIS than in all NACE classes; secondly, average and median values do not vary strongly; and thirdly, KIS tend to employ higher shares of technical and particularly scientific personnel than the average of all NACE classes.

Figure 14: Share of scientific, technical and other personnel in KIS, compared to all NACE classes (2007, NUTS 1)

Data source: RKF database

This leads to some important conclusions with respect to staff and qualifications at the regional level. The first finding – the higher range of values in KIS than in the NACE total – implies a higher heterogeneity among KIS compared to the total industrial fabric. Obviously, there are a number of regions in which KIS with high shares of technical and scientific personnel are located. While the ten European regions with the highest shares of scientific personnel in KIS (2007) are mostly located in Greece, Poland and Belgium (cf. table 5), German and Italian regions are leading the European regions with the highest shares of technical personnel in KIS (cf. table
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6). This may be interpreted as an indication of different KIS specialization structures in European regions. Comparing these figures with the respective indicators for all NACE classes shows that – particularly when considering the share of scientific personnel – rather the European capital regions (the three Belgian NUTS 1 regions, Berlin, Luxemburg, East Sweden, West-Nederland, the Paris region, London, and the central region of Poland) are leading the list of European regions. Respectively, German federal states, Italian regions and the Czech Republic display the highest figures for technical personnel shares of European regions. These latter findings mirror the high importance of the manufacturing sectors, particularly technology-oriented ones, in these regions.

The near neighbourhood of mean and median values indicates that the considered variables do not show significant outliers or extreme values.

Table 5: The ten European regions with the highest share of scientific personnel in KIS 2007

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR1 - Voreia Ellada</td>
<td>51.0</td>
</tr>
<tr>
<td>GR2 - Kentriki Ellada</td>
<td>46.7</td>
</tr>
<tr>
<td>PL1 - Centralny</td>
<td>46.7</td>
</tr>
<tr>
<td>PL3 - Wschodni</td>
<td>45.7</td>
</tr>
<tr>
<td>GR4 - Nisia Aigaiou, Kriti</td>
<td>45.4</td>
</tr>
<tr>
<td>BE3 - Région Wallonne</td>
<td>45.3</td>
</tr>
<tr>
<td>PL2 - Poludniowy</td>
<td>43.6</td>
</tr>
<tr>
<td>PL5 - Poludniowo-Zachodni</td>
<td>43.2</td>
</tr>
<tr>
<td>GR3 - Attiki</td>
<td>42.8</td>
</tr>
<tr>
<td>BE2 - Vlaams Gewest</td>
<td>42.4</td>
</tr>
</tbody>
</table>

Data source: RKF database

Further and referring to the third – and possibly most important - finding, the analysis points out the above-average importance of KIS concerning the employment of highly qualified personnel, both in scientific and in technical fields. This points to the specialized activities knowledge-intensive service firms provide, on the one hand, and also to the important function of KIS as employers: KIS tend to provide excellent job and income opportunities, particularly for highly qualified personnel.

Link of KI(B)S und high und medium high-technology manufacturing

The sheer fact that knowledge-intensive business services are important drivers of regional growth – both in terms of employment and GDP – is not sufficient to derive policy conclusions. More important is the identification of regional (and national) pre-conditions that are conducive for KI(B)S foundation and growth processes. One important shaping factor in this regard is the structure of the regional manufacturing sector. Against the hypothesis that a demanding manufacturing sector – typically emanating from high and medium

Table 6: The ten European regions with the highest share of technical personnel in KIS 2007

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEE - Sachsen-Anhalt</td>
<td>44.1</td>
</tr>
<tr>
<td>DE8 - Mecklenburg-Vorpommern</td>
<td>42.5</td>
</tr>
<tr>
<td>ITD - Nord Est</td>
<td>41.3</td>
</tr>
<tr>
<td>ITC - Nord Ovest</td>
<td>41.0</td>
</tr>
<tr>
<td>ITE - Centro (IT)</td>
<td>39.5</td>
</tr>
<tr>
<td>ITF - Sud (IT)</td>
<td>37.0</td>
</tr>
<tr>
<td>DE5 - Bremen</td>
<td>35.9</td>
</tr>
<tr>
<td>DEG - Thüringen</td>
<td>35.8</td>
</tr>
<tr>
<td>ITG - Isole (IT)</td>
<td>35.8</td>
</tr>
<tr>
<td>DE4 - Brandenburg</td>
<td>35.3</td>
</tr>
</tbody>
</table>

Data source: RKF database
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high-technology-based firms – causes the establishment of a strong knowledge-intensive business service sector in order to satisfy their demand, figure 15 and figure 16 show the interrelationship between the KIS, respectively KIBS, and high and medium high-technology manufacturing in a regional dimension.

Figure 15: Location quotients of KIS und high und medium high-technology manufacturing

Data source: RKF database/Eurostat

Methodologically, the (regional) co-location patterns were calculated on the basis of localization coefficients, both for the KI(B)S and the high and medium high-technology sectors and have been matched according to the different combinations. The value 1 has been fixed as a threshold for specialization in both sectors.

Regarding the co-location pattern between the KIS sector and the high and medium high-technology manufacturing sector, the following map (figure 15) shows that simultaneous specialization in the KIS and high and medium high-technology sector can be observed in various regions. This applies for peripheral regions in France (e. g. Alsace), Sweden, Denmark, the western part (and some southern regions) of Germany, Southern Finland, Belgium, and parts of the UK. In these regions, KIS services and high and medium high-
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technology manufacturing firms seem to be evolving in close prox-
imity. It can be noted that, due to the heterogeneity within KIS, no extreme specialization in general can be observed. Furthermore, although the number of activities in focus increased, the core–periphery gradient remains in place.

On the other hand, when looking at the results for the specialization patterns in KIBS and high and medium high-technology manufactur-
ing (figure 16), fewer and economically strong regions in southern and western Germany (Upper Bavaria, North Rhine-Westphalia), northern Italy (Lombardia), Spain (Cataluna), and also in the southern and south-western parts of the UK are specialized in both. In these regions, linkages between the two sectors seem to prevail. However, especially in quite a few capital regions, KIBS specialization can be observed, while the high and medium high-technology manufacturing sector shows no specialization. In these regions, the KIBS sector is obviously less interlinked with the manufacturing sector. Hence, KIBS in capital regions may have other functions than those in regions which are specialized in high and medium high-technology manufacturing. Another group of regions (located in central France, many eastern European regions in Hungary and Romania) is specialized in high and medium high-technology manufacturing, but not in KIBS. Taking up the considerations of Smedlund and Toivonen (Chapter 2), it can be hypothesized that innovation networks in manufacturing may prevail in those regions – at least in those which are located in the upper left corner of the scatter plot. If that was the case, demand for specialized KIBS would thus far be too small. In order to verify this hypothesis, case studies would be needed to shed light on the innovativeness of the manufacturing firms, on the one hand, and, on the other, their demand for specialized services. Other explanations could be that firms in those regions provide services internally or that their demand for business services in general is rather low.

Quite a large number of regions are neither specialized in KIBS nor in high and medium high-technology manufacturing. These regions are located at the periphery. The following cluster analysis may help to investigate whether they show comparable specialization patterns, e. g. in agriculture, or whether a further sub-division occurs.

14 Also figure 15 leads to the conclusion that regions in Sweden and Finland are specialized in KIS, but not in those which are related to business.
Summarizing, it can be stated that although no correlation between KIBS and high and medium high-technology manufacturing firms exists, a very pronounced difference between core regions with a high concentration of both activities and peripheral regions with either of the two concentrated or – worse – no concentration at all, becomes visible. While KIBS spread also to urban centres in New Member States, high and medium high-technology manufacturing activities seem to remain within the core regions of Europe (blue banana and yellow banana).

Typology of regions according to KIS and other structural and industrial characteristics

In order to obtain a more comprehensive picture of European regions in the light of their industries, and specifically their service sector, Europe's NUTS 2 regions were subjected to a cluster analysis. This
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classification procedure aims to detect possible patterns and types of European regions according to their knowledge-intensive service sectors. This analysis integrates a range of variables in a multivariate way and may thus lead to a better understanding of the complex structure of European service industries. The analysis includes basic characteristic of European regions – for instance, the GDP and GDP growth or their density in terms of population – as well as industrial characteristics such as the share of employment in agriculture and industry and in high and medium high-technology industry fields – and regional KIS characteristics. These latter refer to the employment share in different types of KIS, to regional specialization and to the shares of personnel with technical and scientific orientations in KIS (table 7). Variables generally refer to the year 2007 (if not indicated otherwise).

Table 7: Overview of variables utilized in the regional clustering procedure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>NUTS 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge-intensive high-tech services: Share of employment from all NACE classes 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge-intensive market services: Share of employment from all NACE classes 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge-intensive financial services: Share of employment from all NACE classes 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localization quotient knowledge-intensive high-tech services 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localization quotient knowledge-intensive market services 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localization quotient knowledge-intensive financial services 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compound annual growth rate (CAGR) knowledge-intensive services 2002-2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth (CAGR) of GDP 2002-07 (purchasing power parities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP 2007 (purchasing power parities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of scientific personnel in KIS 2007</td>
<td></td>
<td>NUTS 1*</td>
</tr>
<tr>
<td>Share of technical personnel in KIS 2007</td>
<td></td>
<td>NUTS 1*</td>
</tr>
<tr>
<td>Share of miscellaneous personnel in KIS 2007</td>
<td></td>
<td>NUTS 1*</td>
</tr>
<tr>
<td>Agriculture, fishery and forestry: Share of employment in the primary sector from all NACE classes 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial sector: Share of employment in the manufacturing sector from all NACE classes 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population density 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of population with tertiary education levels (ISCED 5-6) from population aged 25-64 2007</td>
<td></td>
<td>NUTS 2</td>
</tr>
<tr>
<td>Business Enterprise Research and Development (BERD) 2007: Share of regional GDP</td>
<td></td>
<td>NUTS 2**</td>
</tr>
</tbody>
</table>

* These variables are not available at the level of NUTS 2 regions. Therefore, the respective NUTS 1 values were transferred to the corresponding NUTS 2 regions.
** These figures were not available for 2007 in all cases, so the following data was used: Brandenburg Nordost/Südost: figures for 2005; Greek regions: figures for 2005; French regions: figures for 2004; Italian regions: figures for 2005.
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The clustering procedure was performed in two steps, the first one being a hierarchical cluster analysis based on the variables as shown in table 7. This procedure delivers a dendrogram or tree diagram, a graphical output that illustrates the clustering structure and supports the building and explanation of regional clusters or types. This output points at eight clusters of European regions that are realized after six iteration steps. However, due to single missing cases, the hierarchical cluster analysis excludes a range of regions, so that a second step – a k-means cluster analysis - was added. This type of clustering has the great advantage of including cases with single missing values in the procedure (by analyzing existing data). K-means clustering thus could be based on all 267 NUTS 2 regions. However, the k-means clustering procedure requires the number of clusters to be built beforehand, as well as cluster references or predefined cluster centres. In this respect, the results of the hierarchical cluster analysis were used for the selection of reference regions:

- RO21 Nord-Est (high share of employment in agricultural sector)
- DE11 Stuttgart (high importance of high and medium high-technology manufacturing as well as BERD)
- UKI1 Inner London (high density and prosperity, as well as high share of service activities)
- GR22 Ionia Nisia (low share of KI market services)
- CZ04 Severozápad (low share of the population aged 25 – 64 with tertiary qualification, ISCED levels 5-6)
- RO32 Bucuresti (high level of BIP growth 2002-07 in purchasing power parities)
- CZ05 Severovýchod (high share of industrial employment)
- ITC4 Lombardia ("average region")

The resulting eight clusters of European regions consequently have to be interpreted in the specific context of the defined variable set and the chosen analytical procedure. Referring to the cluster mean values in comparison with the total mean (cf. table 8), the regional clusters are characterized as follows:

Cluster 1 is characterized by comparatively small deviations from the European average concerning the variables considered in the clustering procedure (i.e. cluster of regions constituting the average). Compared to the average of European regions, cluster 1 regions have slightly above-average shares of high-tech, service and financial knowledge-intensive service shares, however with below-average shares of scientific and technical personnel. Both the average growth rate of KIS and the share of high and medium high-technology manufacturing employees are slightly below the European average. The share of employees in the agricultural and manufacturing sectors is slightly below the European average, as well as the share of business enterprises’ expenditures for research and development, measured as percentage of the respective regional GDP. These regions seem to be in a restructuring process from formerly industrial characteristics. Knowledge-intensive services are slightly above the average of European regions, but not outstanding. Regions of this cluster are mainly located in France, Spain, Portugal, Sweden and the United Kingdom (cf. figure 17). 59 European regions belong to this cluster.

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15 The analyses were performed with SPSS 11.0
16 Standardized data; cluster method: linkage between groups/Euclidian distance.
17 The analysis was performed with standardized data (z-transformation) and pair-wise deletion of missing values.
Cluster 2 is composed of 29 regions, mainly located in eastern Europe (Bulgaria, Czech Republic, Romania, Slovenia, and Slovakia) and Portugal. They are basically characterized by comparatively low GDP figures (about 50% of the European average), but high GDP growth rates, high shares of employees in the agricultural and industrial sectors, low population density, share of inhabitants with tertiary education and BERD per GDP figures (i.e. representatives of the agricultural and industrial economy). Knowledge-intensive services of all considered types (high-tech, market and financial services) are on average the lowest in Europe. However, on average, a comparatively high share of persons is employed in high and medium high-technology sectors. The economic structure of these regions can thus be characterized as shaped by agriculture and manufacturing, with a certain focus on high and medium high-technology sectors.

Being composed of 19 regions and dispersed all over Europe, Cluster 3 can be described as the technology and business research-oriented cluster. It has above-average, but not extreme figures concerning the share of high-tech and market services and above-average figures of the respective localization coefficients. Outstanding in this cluster are the high values of high and medium high-technology manufacturing sectors (in terms of employee shares) and the high BERD per GDP. These figures result in an above-average, but not extremely high per capita GDP. The population density of the regions in this cluster is below the European average, and the share of manufacturing sectors is comparatively high, slightly above the European average. Mainly Belgian, German, Finnish, Swedish and British regions belong to cluster 3.

On the contrary, Cluster 4 regions are clearly the wealthiest ones in Europe. They have by far the highest GDP and are the most densely populated in Europe. They also have the highest KIS shares, particularly in financial services. This cluster is formed by London and Luxembourg, the European outstanding financial and service centres. It is interesting to observe that these two regions prove to have outstanding characteristics in the selected variables and so build an individual cluster.

Cluster 5 is highly characterized by its above-average position in all three types of knowledge-intensive services, especially by its share of market KIS. It is comprised of only one region: Brussels.

In contrast to this one, Cluster 6 could be characterized as the technical followers cluster in Europe. On average, this cluster is less densely populated than the European average and has below-average shares of population with tertiary education levels. Remarkable are firstly the high share of technical personnel in KIS – on average, the highest figures in Europe – and the slightly above-average share of high and medium high-technology employment, related to an average employment share of nearly 30% in manufacturing sectors. Their GDP is above, but their GDP growth rate below the European average. According to our typology, 71 European regions belong to
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This cluster. They are located in a "north-south corridor" at the centre of Europe, basically incorporating Danish, the majority of German and Italian regions, Dutch as well as the eight Austrian NUTS 2 regions, and French Lorraine and Franche-Comté. On average, they are characterized by both manufacturing and service sectors without specific specialization in high-tech, market or financial KIS, but a tendency towards technical fields (cf. particularly the share of technical personnel in KIS).

Comprising the main capital regions in Europe, Cluster 7 can be characterized as business research and service-oriented and strongly service-driven. It covers mainly the same regions as in the previous analysis proved to be specialized in KIBS, but not in high and medium high-technology manufacturing. On average, this cluster has high shares of KIS employment and particularly high localization quotients in high-tech services. Above-average GDP figures correspond to this cluster, but slightly below-average high and medium high-technology manufacturing values. On the other hand, the share of employment in the primary and secondary sectors is below the European average, while research in the private business sector is above the overall average. Regions in this cluster on average have a well-educated population and are highly, but not extremely, densely populated. Vienna, Dutch and Belgian regions, Prague, various German state capitals and Berlin, the Helsinki, Paris, Rome and Athens regions, Bratislava, Stockholm as well as diverse British regions belong to this cluster.

Cluster 8, finally, is composed of regions with high growth rates of knowledge-intensive services and regional GDP, but with moderate GDP levels in 2007. The share of scientific personnel in KIS is on average the highest in Europe. These regions are less densely populated than the European average, and they have comparatively high shares of employment in agriculture. Having the lowest average BERD figures among the European regions, these regions seem to be the service catching-up regions of Europe. Their average employment shares in manufacturing sectors and below-average shares in high and medium high-technology manufacturing might indicate a

![Figure 17: Typology of European regions with respect to selected characteristics of the knowledge-intensive service sector](image)
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development path from agricultural to service-oriented fields without strong specialization in high-tech manufacturing sectors, 55 European regions belong to this cluster in our typology, comprising Belgian, Spanish, Greek, and Polish regions, as well as the Baltic states, Cyprus, Corsica, Bucharest and parts of Ireland.

As the comparison of figure 16 and figure 17 shows, non-specialized regions in figure 16 are quite dissimilar within the cluster analysis. Mainly, they fall into the clusters 1, 2, 3 and 8.

IV Policies for service innovation and knowledge-intensive services in Europe

This chapter analyzes at first how policies to stimulate service innovation can be justified. Based on these considerations, actions by EU and its Member States will be described. The chapter concludes with three case examples – two at national level and one at regional level. As will become clear, in order to be effective, focusing on the KI(B)S sector is not advisable in order to spur service innovation in general. However, this sector will be an important beneficiary.

Legitimacy of service innovation policies and derived recommendations

As with any political intervention, launching policies aiming to promote innovation in services has to be justified. Rubalcaba (2006) discusses arguments based on macro-economic rationales, market failures and systemic failures.

- With regard to macro-economic reasons, it can be argued that service innovation raises productivity and stimulates innovation in general. However, participation of service firms in R&D programmes is relatively low (compared to their economic share). Hence, in order to reach the 3 % aim of GDP in R&D investments, it is necessary to increase service sector participation.

- Due to the intangible nature of services, and especially new services, the level of uncertainty and information asymmetries is quite high, on the demand side. This could limit demand and can thus be regarded as market failure. Another case of market failure is associated with externalities derived from free-riding. Innovative services are in part hard to protect from being copied. This could justify the implementation of policies to protect intellectual property. In addition, empirical evidence shows that services are not distributed evenly over space. As shown above,
there is a strong centre-periphery gradient observable that may put peripheral areas at a disadvantage if services are tied to close and thus local interaction. Especially the liberalization of telecommunications demonstrated the influence of monopolistic power on innovativeness. Today, various services with differentiated pricing models are available. Hence, disentangling monopolistic market structures can be conducive to stimulating innovation in services (see EC Commission Staff (2009: 48ff.) for further discussion of market failures).

- While market failures lead to more specific types of intervention, abolishing systemic failures aims to raise the efficiency of innovation as a whole. To detect systemic failures, the focus is on deficiencies with regard to institutions, infrastructure, capabilities, networks and the socio-cultural environment, and their structure. In the case of institutions, the link to market failure arguments is close, as the case of regulation against monopolistic market structures demonstrates. Infrastructure failures would arise if, e.g., the lack of ICT impedes innovative activities. According to the EC Commission staff (2009), the lack of innovation management capabilities is the most frequently mentioned barrier to innovation in European SMEs. Over the last years, the promotion of networks became quite prominent in innovation policy. As networks are important for knowledge exchange and diffusion, these measures aim to stimulate interaction between various actors. Deficiencies in the socio-cultural environment could refer to reluctance on the demand side to take up innovations, or low propensity to undertake entrepreneurial risks. This is particularly the case for services which are hard to protect from being copied. As becomes clear, the identification of such systemic failures is not straightforward.

In addition, policies to support technology and innovation are generally tailored to manufacturing sectors and their innovation activities. However, in order to give incentives for innovative services, policies should consider the question, whether the service sector has certain specificities of innovation processes that should be reflected in policy measure design, or possibly require specific policy responses. Three lines of argumentation can be identified in the literature: (1) If innovation in services and innovation in manufacturing are regarded as being similar, adapting policies so far aimed at manufacturing sectors would be sufficient (assimilation approach). (2) On the other hand, if service innovation is considered to be of a totally different nature, only specific policies would be appropriate (demarcation approach). (3) In between these two extremes lies the third approach, that is based on the assumption of differences, but also similarities. Hence, the question whether to extend existing policies or to derive new ones, needs to be answered specifically in every single case (synthesis approach) (Rubalcaba 2006).

These considerations lead to the conclusion that innovation in services needs to be targeted, rather than service industries. The OECD (2006: 13) points out that: "Most firms provide KISA [knowledge-intensive service activities] internally with decisions to seek external sources of KISA depending on many factors, including the size of the firm, life cycle of the innovation process, and nature of the particular service". As the boundaries between manufacturing and service firms are increasingly blurring, excluding manufacturing firms from policy programmes would cause legitimacy concerns. What is more, manufacturing firms may transform into service firms, either driven by changes in customer demand or firm strategy. In addition, service firms may spin-out of manufacturing firms. Examples can be found in fields like technological consultancies, vocational training providers or specialized IT firms.

So far, policies supporting service innovation are considered to be underdeveloped (Bos et al. 2010: 11; EC Commission Staff 2009: 65; Kuusisto 2008: 4). The concern is that innovation policy focusing on technological innovation favours manufacturing activities while overlooking innovation, e.g. in marketing or organization,
which is much more relevant for services. Van Cruysen and Hollanders (2008) propose to take action with regard to several areas specifically aiming at overcoming market failure in service innovation:

- Intellectual property rights: incentivize KIS SMEs to make use of IPR, specifically trademarks
- Public procurement: make strategic use of public procurement, specifically in markets which are dominated by a few major suppliers
- Qualified personnel: promote programmes aiming at providing service skills, vocational training and training on the job with specific focus on language and social skills
- Access to public science: facilitate links of public science and KIS and support collaborative research
- Support for innovation programs: orient innovation programmes towards the requirements of service sector companies
- Regulatory burden: identify and improve regulation that hampers cross-border service provision
- Access to finance specifically with regard to start-ups: establishing an attractive venture capital market is beneficial for all firms, but specifically for KIS, since most start-ups are service firms.

In a broader way, Wood (2005: 441) calls for adopting a service perspective in innovation policy which can be further broken down into three areas (Rubalcaba 2006: 755):

- Reflecting on impacts of R&D policies on service innovation
- Better recognition of services in R&D programmes
- Stronger incorporation of services in the innovation system.

Over the last years, several measures have been taken to overcome the identified obstacles. Some initiatives and measures will be detailed below.

Service innovation policy at EU level

The European Union promotes innovation in services with horizontal and vertical measures. Several Directorates-General are involved in this process (EC Commission Staff 2009: 78ff.):

- By introducing the Europe 2020 Strategy, the European Union tries to achieve smart, sustainable and inclusive growth. Out of the seven flagship initiatives, the initiative "Innovation Union" endorses a broad understanding of innovation and aims to promote innovation in both products and services (European Commission 2010b). In addition, within the flagship initiative "An industrial policy for the globalization era", the EU emphasizes that "it is essential to increase productivity in manufacturing industry and associated services to underpin the recovery of growth and jobs, restore health and sustainability to the EU economy and help sustain our social model". However, it goes on to state that "industry is therefore at centre stage of the new growth model for the EU economy as outlined in the Europe 2020 Strategy." As such, service innovation is less significant in the Innovation Union (European Commission 2010a: 3) (see further Halme et al. 2010).

- DG Internal Market & Services: the Service Directive has been adopted to fully employ the benefits of the Single Market.
- DG Research: within the Framework Programmes, several measures also aim to support innovation in services.
- DG Digital Agenda: ICT have been an important field of policy-making for many years. Recently, the Communication "A Digital
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Agenda for Europe" underpinned the social and economic potential of ICT.

- DG Enterprise and Industry: for several years, policies have been tested to improve support for service innovation, e. g.:
  - Within the framework of PRO INNO Europe the Innovation Policy Project in Services operated between 2006 and 2007 (INNO NETS/TEKES 2007). It was followed by the recent project EPISI (European policies and instruments to support service innovation) which aims to facilitate transnational cooperation between policymakers and innovation agencies in the field of services innovation to promote good-practice in service innovation policies.
  - Europe INNOVA, e. g. European Knowledge-Intensive Services Innovation Platform (KIS-IP) launched in 2009. KIS-IP aims to accelerate the take-up of service innovations in Europe.
  - In addition, the High-level Expert panel on Services Innovation installed in 2010 to recommend on service innovation policies. As a response to the Europe 2020 Strategy, within 2011 two new innovation initiatives will be launched, the European Creative Industries Alliance and the European Mobile and Mobility Industries Alliance (Halme et al. 2010).

- DG Regional Policy: a wide range of measures implemented within the frameworks of cohesion policy focus on KIS. These measures are supported by several cross-cutting policies, in which the EU is active: IPR, qualification and procurement (see European Commission (2007: 13 ff.)). In addition, the signing of the "European Services Innovation Memorandum" (signed by nine national and regional ministries and innovation agencies from Finland, Estonia, Ireland, Germany, the Netherlands, Norway, Slovenia, Sweden and Greece in December 2007) signifies the increasing interest in this policy field.18

Service innovation policy within the Member States

The awareness of service innovation as being crucial is rising and thus policy attention at national level increases. However, as can be expected, Member States differ in terms of the prominence given to the subject. One important factor is the general approach to public intervention. As the comparative policy studies like "Service Innovation in the Nordic Countries – Key Factors for Policy Design" (ServINNo) (Bloch et al. 2008; Kuusisto 2008) or the project "United We Stand: Open service innovation policy schemes" (Bos et al. 2010) show, countries differ with regard to the level of interference in service activities. Apart from tendencies to regulate economic activities, the importance of services versus manufacturing activities is a significant aspect, e. g. in Finland, service policies have been implemented as part of a diversification strategy (Bos et al. 2010).

In 2007, a questionnaire-based survey within the INNO-Policy Trend Chart initiative (Cunningham 2007) was realized in order to provide an overview of service innovation policies in Europe and other countries.19 The results show that major differences exist with regard to reference in policy statements (i.e. explicit mentioning of service innovation in policy statements) and policy debate (i.e. service innovation as topic of political debate). Table 9 provides an overview of the findings sub-divided into three groups – leading group, following group and countries with little or no policy attention. In many countries, political statements and policy debates go hand in hand, yet differences occur. Except for Cyprus, Estonia and Latvia, New Member States fall into the group of countries that reported a low level of political debate.

19 An initial survey was conducted in 2006.
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These findings were also reflected in the National Reform Programmes (NRP). In the 2008-2010 period, only Denmark, Finland, Germany, Ireland and the UK seemed to plan new innovation strategy or specific action plans focused on services innovation (EC Commission Staff 2009: 66ff.). According to a recent policy brief (Halme et al. 2010), major policy developments can be reported from the Netherlands, Denmark, Sweden, Germany and the United Kingdom.

It has to be stated that nowadays many innovation support measures are open to manufacturing as well as to service firms. However, a bias towards manufacturing firms is obvious, since many innovation-support mechanisms favour technological innovation (EC Commission Staff 2009). Hence, the assimilation approach applies (Bos et al. 2010: 35). Sector-specific service-oriented policies mainly focus on ICT and software, as well as building and construction, healthcare, leisure and tourism, logistics, transport and infrastructures. Quite recently, the creative industries sector has also gained more policy attention (Cunningham 2007: 29). Nevertheless, within the INNO-Policy Trend Chart survey (Cunningham 2007) policies to promote innovation in KIBS have only been reported from Sweden and Finland.

| Table 9: Advancement of countries with regard to policy statements and policy debate on service innovation |
|---|---|
| **Policy statements** | **Policy debate** |
| Leading group | - Denmark<sup>20</sup> | - Cyprus |
| | - Finland | - Germany |
| | - Germany | - Denmark |
| | - Netherlands | - Estonia |
| | - Sweden | - Finland |
| | - Cyprus | - Ireland |
| | - Estonia | - Italy |
| | - Ireland | - Latvia |
| | - Italy | - Netherlands |
| | - Latvia | - Sweden |
| | - Malta | - United Kingdom |
| | - Portugal | - United Kingdom |
| | - Poland | - United Kingdom |
| | - Slovenia | - United Kingdom |
| | - Slovakia | - United Kingdom |
| | - United Kingdom | - United Kingdom |
| Following group | - Austria | - Austria |
| | - Belgium | - Spain |
| | - Bulgaria | |
| | - Czech Republic | |
| | - Spain | |
| | - Hungary | |
| | - Lithuania | |
| | - Luxembourg | |
| Little/no policy attention | - France | - Belgium |
| | - Greece | - Bulgaria |
| | | - Czech Republic |
| | | - France |
| | | - Greece |
| | | - Croatia |
| | | - Hungary |
| | | - Lithuania |
| | | - Luxembourg |
| | | - Malta |
| | | - Poland |
| | | - Portugal |
| | | - Romania |
| | | - Slovakia |
| | | - Slovenia |

Source: Cunningham (2007)

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<sup>20</sup> The first five countries formed the leading group already in the 2006 survey.
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The regional focus of service innovation policies is most obvious in cluster policies (see Cunningham 2007 for examples). Apart from these schemes, most service innovation policies have a national perspective (Bos et al. 2010: 11), while broad programmes are rare at regional level. However, as demonstrated in Chapter 3, the service activities are not distributed equally over space, so that certain regions will be more likely to benefit from national policy schemes than others. For example, policies affecting the financial sector in the UK will mainly impact on the London area.

Case examples of service innovation policies

In the following, three case studies show national and regional approaches to promote service innovation. The examples were chosen because they also differ with regard to industrial focus, covering the broad panoply of industries versus KIS and KIBS in particular.

Case example: Innovation with Services - Germany

In 2006, the German Federal Ministry of Education and Research launched the programme "Innovation with Services". Until 2011, €14 m per year are made available in this support programme. Support is granted in three fields:

- Innovation management: although services are marked by a high level of customization, standardization, quality management and certification will become more important in the future. Against this background, the development of methods to design service innovation, to develop certification procedures and other projects in the field of innovation management for services are subsidized.

- Identification of growth sectors: employment growth can be expected in service industries with growing markets. The aim is to develop criteria and measures to identify and exploit these potentials. Spheres in which these potentials can be expected are business services and services in the context of demographic change.

- Human resource management in service companies: especially in customer-oriented services which require a high level of flexibility, the link between employees' satisfaction and motivation with the provided service level is high. Hence, improvements in the work environment might be important for service innovation. Projects with regard to work design, as well as qualification and competencies of qualified work on services, are eligible for co-funding.

The programme aims to leverage synergies with other programmes. In addition, it was "designed as a "learning programme", i.e. upcoming calls for proposals will reflect the results of current projects as well as general trends in the service sector" (Fraunhofer Institute for Industrial Engineering (IAO) 2007: 10). The programme is open to companies as well as higher education and research institutions.

Case example: Serve – Finland

The Serve – Pioneers of Service Business programme was launched in 2006 as a five-year programme. Due to its success, it has been prolonged until 2013. Serve provides funding for R&D projects that result in new service-based business ideas, including products, production processes and business models. In addition, academic research focusing on services and particularly service innovation is funded during specific application periods. Apart from funding, Serve supports participating companies and research institutes in the development of their service business competence. The aims of the programme are to:

- increase the service product development competencies of service firms

- promote systematic development capacities of SMEs offering customer-oriented service products

- facilitate the development of new business ideas based on service innovations in various sectors.
Projects eligible for funding have to demonstrate novelty at the national level (Kuusisto 2008).

**Case example: Dienstleistungsoffensive – Baden-Württemberg, Germany**

In 2000, the federal state of Baden-Württemberg started a competition to award the "service company of the year". Since then, every second year three companies – each in one domain – have been awarded the prize. The three fields are: ideal customer service, exemplary service innovation and outstanding cooperation in service networks. The competition aims to increase public awareness of the importance of services for growth and employment. For the winners, the award has positive reputational effects.

Since 2002, the competition has been part of a broader initiative, the so-called Dienstleistungsoffensive (Service Offensive) (Landtag von Baden-Württemberg 2009). The initiative was launched to promote several service industries and cross-cutting topics. Among the service industries, Baden-Württemberg promotes, for example, logistics, financial services, health services, and creative industries. The promotion of financial services mainly aims at supporting Stuttgart as a financial centre, while other measures have a wider spatial focus. Cross-cutting topics are establishing cooperation and networks, improving (international) marketing of services and spurring on service innovation. In order to transfer knowledge and best-practice on topics like service-engineering, research projects between research institutions and intermediaries like chambers of commerce or associations have been funded, too.

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**V Summary and policy conclusions**

**Summary**

The analyses in this booklet aim to give a detailed picture of knowledge-intensive services and knowledge-intensive business services in Europe, with a special view to their spatial patterns in European regions. Following an overview of the literature and main topics discussed in service and innovation research, the analysis identified various aspects to be investigated in the light of European statistics. It also referred to data availability questions and emphasized the difficulties in measuring innovation activities in knowledge-intensive service firms at the regional level.

The empirical analyses showed that there are indeed spatial patterns in knowledge-intensive services among European regions. This finding is particularly based on the investigation of employment and occupation structures and patterns. KIS employment is particularly high in central and northern Europe, while employment shares in knowledge-intensive business services show a more focused picture: figures are less pronounced in the northern regions.

Knowledge-intensive high-tech services are mainly concentrated in European capitals, as well as in further metropolitan regions. On the contrary, knowledge-intensive market services show high employment shares in central and northern European regions, while the analysis of knowledge-intensive financial services produced a clear picture of the main financial centres in Europe. Besides well-known centres like Luxembourg, London or Darmstadt (Frankfurt) and the surrounding areas, financial centres in the New and eastern Member States clearly appear on the map: Prague, Bratislava, Warsaw, as well as Cyprus and Malta show a high specialization in this field. The specialization assumption could also be confirmed in the light of occupational patterns, indicating different and specific types of
knowledge-intensive services in the European regions. In general, a
centre-periphery gradient is quite obvious.

Further, the analysis clearly confirmed the dynamic growth of
knowledge-intensive services in European regions. It showed the
linkage of KIS and KIBS employment with GDP, thus pointing to
the fact that regional wealth and knowledge-intensive service em-
ployment are highly related. This relationship is coherent with the
findings of Europe INNOVA (2009: 2/3) stating that wealthy re-
gions have a disproportionally high concentration of KIBS employ-
ment. More specifically referring to innovation indicators, this report
based on the Cluster Observatory points to the fact that regions with
high KIBS concentrations tend to have higher patent activity (al-
though emphasising that a range of further factors may have an in-
fluence on innovative activities).

The empirical part ended with a multivariate picture of European
regions with specific consideration of their KIS characteristics. Eight
types of regions with specific characteristics could be identified.
This finding again supports the high heterogeneity and regional
specificities of KIS and their environments – an important finding to
be considered in the context of service-supporting policies at re-
gional level. The empirical analysis ended with the discussion of
policies, their rationales, arguments and examples of service policy
implementation at the European level.

Policy conclusions

For some years, policies to support the service sector and service
sector innovation have been widely discussed at the European level
and beyond (see for instance EC Commission Staff 2009; European
Commission 2007; Rubalcaba 2006; United Nations Economic
The differentiation into service industries and manufacturing indus-
tries is blurring, and services are nowadays crucial for the competi-
tiveness of manufacturing firms – not only in the sense of mainte-
nance. The trend is directed to selling packages of goods and ser-
dies, as the examples of mobility concepts tested by car producers
or smart metering demonstrate. This is also reflected in the results of
a public consultation conducted in 2009 by the European Commis-
sion: both service and manufacturing firms indicated that better sup-
port for service innovations would be necessary (European Commis-
sion 2009). This indicates that support measures should encom-
pass innovative service activities in all kinds of firms.

However, as the results of the Community Innovation Survey 2008
reveal, service firms receive less public funding for innovative ac-
tivities than manufacturing firms. Therefore, a challenge can be seen
in developing more appropriate policies to meet the specifics of
service innovation. While some countries have been formulating
targeted policies and are debating service innovation, there are many
countries that are hardly active in this policy field. In order to en-
courage policy learning, further promoting the exchange at European
level seems to be a sensible measure, as also expressed as one of the
main challenges to promote service innovation in the Commission

Besides the heterogeneity of the service sector, referring to the re-
gional dimension, the analyses revealed different specialization
and location patterns as well as diverging growth dynamics in
European regions. This is an important point to be considered: it
seems necessary to adapt supporting policies to the specific context
considered. As the investigation of location quotients and their com-
parison with high and medium high-technology specialization, for
instance, showed, there are various regions without clear specializa-
tion in one field or another, but there are also regions with a high
specialization in knowledge-intensive (business) services or in high
and medium high-technology manufacturing or in both sectors. Sim-
ilar conclusions can be drawn from the cluster analysis that revealed
different types of European regions with specific characteristics. In
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this respect, a more detailed view of the regions considered seems necessary in order to design successful support measures.

If innovation at the regional level is conceived as taking place in a systemic perspective – thus arguing along the regional innovation system approach – then KIBS are considered an integral part of this interrelated set of actors and activities. Following this theoretical assumption, it may prove appropriate to further support the evolution of the whole innovation system, i.e. to accompany and foster its development paths and possibly also anticipate its maturation. Innovation policies exclusively targeted at the service sector could be sub-optimal, while efficient innovation system support would be directed at the whole set of actors and their interrelation. More precisely, this would point to a holistic, system-based policy approach and a balanced set of policy support for all types of actors (manufacturing and services) and activities (R&D and also non-technological innovation), thus being based on a broad understanding of innovation. In some cases, this would imply support for marketing and organizational innovation, for instance, while in other cases qualification measures could enhance innovation within the regional system. Also network-supporting measures have important impacts, based on the observation that – even if the statistical analyses show the coexistence of strong KIBS and (high-tech) manufacturing sectors – interconnection between KIBS and high-tech manufacturing could be enhanced to a higher level. In this case, cooperation support raises the effectiveness of the regional system as a whole.

Regions with a high concentration of either KI(B)S or high-tech manufacturing could improve their innovative performance by strengthening coherence and systemic capacities. Policies should be based on the regional strengths in one of the sectors and aim at transferring these to the other fields of activity. To give an example from the cluster analysis: compared to the European average, a couple of European regions (Cluster 8) seem to have a moderate high-tech manufacturing, but an important agricultural sector, and comparatively high KIS growth rates. This might indicate transformation from a formerly agricultural and (medium technology) industrial specialization to an industry/ service-led one. If the growth potentials of the service sector are supported and exploited, catching-up or even transformation processes could be endorsed. The support of service growth and its radiation into the whole regional economic system might thus witness considerable leverage effects. Once these potentials are recognized, they can be transferred into opportunities for the benefit of the whole regional system. However, in the absence of a broad base of KI(B)S firms, stimulating KI(B)S growth by either focused public procurement or entrepreneurship promotion seems to be more promising as a first step. In any case, in-depth analyses of the distinctive situation in the region in question are necessary, including the analysis of innovation, co-operation, and specific needs of regional companies as well as of obstacles to innovation.

Further, the analyses of this booklet revealed the relationship between knowledge-intensive services and qualification structures. Specific qualification measures (tertiary education, but also vocational training, particularly in technical fields or life-long learning measures) seem important factors to be considered. In this context, it generally seems vital to raise awareness among policymakers and intermediary actors for the distinct characteristics, activities and needs of service firms, and particularly knowledge-intensive service firms. Based on the high knowledge content of their services, knowledge and thus human capital are essential for the success of these types of firms. However, besides formal qualifications, "soft skills" seem important: interdisciplinarity, team orientation, but also knowledge about innovation support, potential cooperation partners, etc. These skills and knowledge could be targeted in specific training measures, tailored to the needs of regional firms.

A further point relates to regional attractiveness for KI(B)S activities and the territorial structure of KI(B)S concentration (measured in
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terms of employment). Generally, metropolitan regions (mostly, but not always, the capital regions) have high shares of KI(B)S employment. Some EU Member States have further regions with high concentrations of KI(B)S employment. This points to the question of regional endowments and (soft) location factors which are crucial for attracting and growth of KI(B)S. Further research will be needed to analyze these factors and devise distinct recommendations for policymaking.

Another facet needs to be considered, which refers to the growth potentials of KI(B)S in the long run. The empirical analyses in this booklet, as well as the literature on knowledge-intensive (business) services reveal the high potential for growth, thus for employment, income and wealth of this sector of activity. As described above, one important factor of KI(B)S growth is related to outsourcing activities. But is there a level or point of saturation of KI(B)S in regional innovation systems? If so, how are "optimal levels" of KI(B)S characterized and which policy conclusions follow in this respect? With regard to this question, the following scenarios have to be considered (Dachs 2009):

a) Growth scenario: the first scenario predicts the continuation of current growth trends, based on a further increase in the specific demand for knowledge-intensive services, coupled with the willingness of industrial companies to engage specialized KIS firms.

b) Do it yourself: this scenario is based on the assumption of maturing services. It thus leads to decreasing opportunities for outsourcing specifically required services, since their codification allows in-house provision within manufacturing firms.

c) Security comes first: this scenario finally is rather sceptical concerning outsourcing services and integrating external actors in innovation processes. For secrecy reasons and in order to prevent spill-out of internal knowledge, in-house provision of required services is preferred, leading to a decreasing demand for knowledge-intensive services on the market.

In the case of the first scenario, policymakers may opt for facilitating new firm formation, as growth will provide opportunities for established as well as new firms. However, in the case of Scenario C, which predicts less demand, supporting start-ups will in most cases be inefficient. Only a few firms which provide innovative and significantly better services will succeed in entering the market, while barriers will be reinforced as competition among incumbent service providers will increase. If the future is shaped by conditions described in Scenarios B or C, public procurement might be a better option to promote innovation in services. Nevertheless, framework conditions such as access to knowledge embodied in people or accessible in exchange with scientific institutions, as well as better recognition of the specific conditions of service innovation in policy programmes, appears to be sensible for all three scenarios.

Finally, as indicated in the empirical part, further in-depth analysis and case studies are needed to shed light on regional dynamics, specifically with regard to linkages of KIBS and high and medium high-technology manufacturing. In addition, the further development of service statistics should be stressed. In fact, the analyses of this booklet were confronted with various difficulties in data availability and challenges of illustrating innovation activities with the help of existing statistics. Although the heterogeneity of service activities and their less formalized innovation approach (when compared with the manufacturing sector) are obvious, future research should also focus on further developing and completing available statistics and indicators, based on in-depth knowledge on KI(B)S and their (innovation) activities.
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Taken together, the following points need to be stressed:

- **Opening up innovation promotion programmes to the service sector is not sufficient to promote service innovation** if non-technological aspects of service innovation are not addressed, too.

- Considering the different degrees of KI(B)S development at regional level, it becomes clear that **"one fits all" approaches of policy programmes are not conducive to innovation**. Rather, it is important to be sensitive to the preconditions of regional potentials and resources, thus having a "close look" at the given territories. This emphasizes the strong relation of policy measures to specific regional conditions, actors and activities, e.g. the inclusion of firms' needs, obstacles, innovation modes and patterns, in other words, close proximity of policy actors to economic and innovation actors. **Experimental policies are necessary in the sense of sharing experience among European regions and introducing "innovative policies" specifically tailored to the region and its potentials.** In some cases, this approach could mean a shift from a strong focus on manufacturing to a broad support of innovation and cooperation.

- The **high importance of qualified human capital** for knowledge-intensive service activities has several implications. First of all, **adequate education and training facilities** need to be provided and adapted to regional business needs. In addition, **highly qualified people are attracted to attractive environments**. This is one aspect that needs to be taken into consideration in comprehensive policy programmes, too.

- Finally, it should be emphasized that research gaps remain, in particular with regard to the relationship and localization of linkages between manufacturing firms and KI(B)S. **A better understanding as described above would be needed in order to promote service innovation more effectively.**
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List of references


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Knowledge-driven clusters in the EU


### Knowledge-driven clusters in the EU

Sub-categories of knowledge-intensive services and knowledge-intensive business services in NACE rev. 1.1

<table>
<thead>
<tr>
<th>NACE Code</th>
<th>KIS sub-category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Water transport (61)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>Other Air transport (62)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>Post and telecommunications (64)</td>
<td>Knowledge-intensive high-tech services</td>
</tr>
<tr>
<td>Financial intermediation, except insurance and pension funding (65)</td>
<td>Knowledge-intensive financial services</td>
</tr>
<tr>
<td>Insurance and pension funding, except compulsory social security (66)</td>
<td>Knowledge-intensive financial services</td>
</tr>
<tr>
<td>Activities related to financial intermediation (67)</td>
<td>Knowledge-intensive financial services</td>
</tr>
<tr>
<td>Real estate activities (70)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>Renting of machinery and equipment (71)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>Computer and related activities (72)</td>
<td>Knowledge-intensive high-tech services</td>
</tr>
<tr>
<td>Research and development (73)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>Other business activities (74)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>– Legal, technical and advertising (74.1t4)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>– Other business activities, nec (74.5t8)</td>
<td>Knowledge-intensive market services</td>
</tr>
<tr>
<td>Education (80)</td>
<td>Other knowledge-intensive services</td>
</tr>
<tr>
<td>Health and social work (85)</td>
<td>Other knowledge-intensive services</td>
</tr>
<tr>
<td>Recreational, cultural and sporting activities (92)</td>
<td>Other knowledge-intensive services</td>
</tr>
</tbody>
</table>

Source: based on EC Commission Staff (2009: 17f.)

### Localization quotient knowledge-intensive service (2007)

- < 0.75
- 0.75 – 1
- 1 – 1.25
- > 1.25
- Not available

Data source: RKF database/Eurostat
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Priced subscriptions (e.g. annual series of the Official Journal of the European Union and reports of cases before the Court of Justice of the European Union):
The aim of the booklet is to provide a detailed picture of knowledge-intensive services in Europe with particular emphasis on their spatial patterns in European regions. The empirical analysis confirms the existence of spatial patterns in knowledge-intensive services in European regions and also provides clear evidence of the dynamic growth of regional knowledge-intensive services.

*Studies and reports*