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Knowledge Intensive Business Services in Regional Systems of Innovation – Initial Results from the Case of Southeast-Finland

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Abstract:

Knowledge intensive business services (KIBS) are believed to hold a decisive role in the creation and diffusion of knowledge within regional systems of innovation, because they can take up a bridging function between producers and users of knowledge. However, research has mainly focused on the role of KIBS in highly developed innovation systems and in metropolitan areas, neglecting their specific role for low-tech industries and peripheral regions. Therefore, the aim of this paper is to discuss the role and significance of KIBS in a peripheral region (Southeast-Finland) that is highly influenced by a dominant industrial cluster (pulp & paper manufacturing). It provides some empirical evidence for KIBS' strategies of learning and for KIBS' embeddedness in regional systems of innovation. Furthermore, the symbiosis between the dominant industrial cluster and the significance of KIBS in this region will be illustrated.

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1 Introduction

1.1 Innovation systems

Research on innovation has shifted its focus from the Schumpeterian type of entrepreneurial innovations towards a new understanding of innovation as a result of interactive processes between different actors embedded in a specific social, political, and economic environment. Consequently, innovation has not only become a more important topic in the context of the market and the firm, but also in the context of regional growth and development.

First systematic approaches towards a conceptual framework of linking innovation and territory focussed on the national level by introducing the concept of national innovation systems (Freeman 1995; Nelson 1993; Lundvall 1992). Whereas the US–perception of national innovation systems (Nelson 1993; Freeman 1995) focuses on infrastructural and institutional aspects of innovation systems (e.g. R&D organisations, universities), the Aalborg-Version (esp.: Lundvall 1998) emphasises the importance of communication and learning for innovations to occur. Learning includes both the acquisition or self-creation of new knowledge and the application of this new knowledge in innovation processes (Schienstock/ Hämäläinen 2001). From this point of view, innovation dynamics are not only determined by the existing knowledge stock, but mainly by the effectivity and the efficiency of learning processes within innovation systems (Lundvall 1992).

Efforts in research to link innovation and territory did not only refer to the national level. Within the context of globalisation (Dicken 1998), the role of national regulatory regimes is changing and there is a tendency that sub-national territories are becoming more important in terms of policy formulation and economic development (Fisher/Gensior 2002, Heeg 2001; Porter 1998, Scott 1996, Storper 1992). Consequently, research about the territorial implications of innovation activities did follow this line by defining sub-national innovation systems, so called regional innovation systems (Braczyk et al. 1998; Cooke 1998; Thomi/Werner 2001).

1.2 Knowledge intensive business services as actors in regional innovation systems

Following the Lundvall-approach at the sub-national level, regional innovation systems (RIS) have to be regarded as open systems constituted in a regional context by relevant actors and the related system of internal and external communication. Obviously, creation, diffusion and application of knowledge became key parameters in studying innovation systems. Whereas the creation of new knowledge could be more precisely discussed in the context of technological innovation systems or trajectories, the question of diffusion and adaptation of new knowledge seems to be more appropriately discussed in the frame of RIS approaches.

The dissemination of knowledge within innovation systems can be organised in various ways and by various actors. Because there is not always a direct territorial or organisational link between knowledge creation and its applications, there seems to be the need for intermediaries

within the system, which are in the position to link relevant knowledge to its places of demand Obviously, those actors that can take up a bridging function between knowledge producers and knowledge users are of great importance for the capacity and quality of innovation systems (Hertog/Bilderbeek 1998; Strambach 1997).

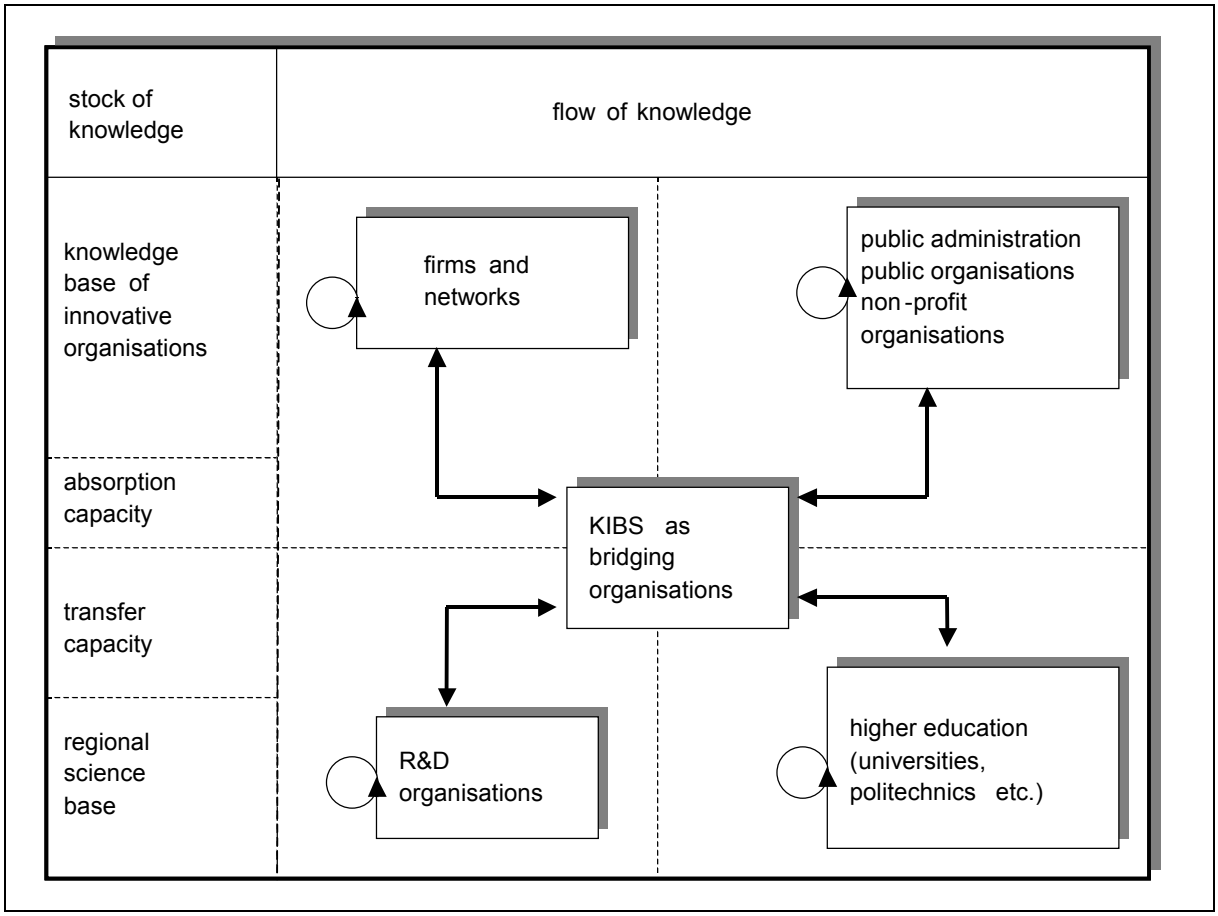
Consequently, regional policies have been trying to support the transfer capacity at the regional level by establishing technology transfer organisations (e.g. related to universities) and by promoting innovation networks between individual firms (Reinhard/Schmalholz 1996). But the impact of these activities is rather limited, because besides the absorption of new knowledge innovative firms need specific *support* in combination and application of this knowledge (Reuter 2001). Thus, actors that are in charge of diffusing knowledge within an innovation system must be able to support knowledge users in the implementation of new knowledge. This dual role is usually attributed to so called knowledge intensive business service companies (abbr. KIBS; Miles et al. 1995).

KIBS are privately owned business firms whose main task is to create knowledge or provide knowledge generating services for other firms. As illustrated by Figure 1 KIBS can contribute to their clients' innovation processes by bringing external knowledge into the client's company (Tomlinson/Miles 1999; Hipp 2000; Lundvall/Borrás 1997). Furthermore, the specific knowledge provided by KIBS to their clients is generally created in interaction with the user (client). This means that KIBS use knowledge inputs from various external sources and combine this with the existing knowledge from their clients. Consequently, it is presumed that KIBS are involved in interactive learning processes with their clients and other actors ("interaction thesis"; Hertog/Bilderbeek 1998; Muller/Zenker 2001; Strambach 1997; Tordior 1994). Another feature usually associated with KIBS is the internal innovativeness of KIBS, based on the opportunity to accumulate competence and experience from different kind of projects ("parallelism thesis"; Czarnitzki/Spielkamp 2000; Hauknes 1996, Strambach 1997).

Within the last decade, the number of KIBS, the number of persons employed in KIBS and the value added by KIBS has grown unprecedently throughout the OECD (1999). But growth rates differ substantially between countries, due to the fact that KIBS fulfil different functions in different economies (Nählinder 2001). For instance, the employment growth has been dramatic in some countries, such as the Nordic states, and less pronounced in other countries, such as Japan (OECD 1999).

The reasons for this growth is still debated. A common argument is that the growth of KIBS sectors is mainly a statistical phenomena, because many KIBS started as spin offs or as outsourced parts of manufacturing firms ("outsourcing thesis"; c.f. Carlsson/Cetindamar Karaomerlioglu 1999). From this point of view the growth of KIBS and the decline of manufacturing sectors would be mainly statistical and not reflect actual changes in the economy.

Figure 1: KIBS as intermediarities (bridging organisations) in regional innovation systems.



Source: based on Reuter (2001).

However, studies carried out in the 1990s show that the increasing role of KIBS can only partly be explained by outsourcing (Strambach 1997). According to Reuter (2001) and others (c.f. Strambach 1997; Tomlinson/Miles 1999) the increasing significance of KIBS represents the central role knowledge intensive services play in modern innovation processes: the general trend towards an increase in innovation dynamics leaves no room for the alternatives "make" or "buy". Instead, competitive innovations require the combination of both internal and external sources of knowledge (Strambach 1997). Hence, the contribution of KIBS towards the innovation capacity of their clients is not only substitutive ("buy"), but also of complementary nature. It may be the fact that firms externalise parts of the knowledge creation processes, but according to the argumentation above these firms subsequently combine the external knowledge with internal knowledge sources. Hence, this kind of externalisation should not be mixed up with the outsourcing argument mentioned earlier.

2 Aims of the study

The literature on KIBS, or which uses the concept, is large (chapter 3.1). However, most of the authors do not link KIBS to innovation systems and only a few studies are embedding KIBS in a territorial context. Thus, studies about the role of KIBS in regional innovation systems are relatively rare.[1]

Existing studies on KIBS suggest that the location patterns of KIBS correspond largely to the clustering activities of their clients (Hertog/Bilderbeek 1998). This phenomena is usually being explained by the necessity of many service firms to be close to their customers (Reuter 2001): spatial proximity to clients facilitates both interactive learning processes and the diffusion of tacit knowledge[2] (Nonaka/Takeuchi 1995; Thomi/Werner 2001). In general, there seems the need to differentiate location patterns and business activities of KIBS by regional and sectoral aspects in order to get a deeper understanding of their specific roles within innovations systems.

Many of the existing studies on regional innovation systems focus on high technology regions bearing the risk, that regional developing strategies derived from these success stories might not fit into other environments where politicians are trying to apply them (Thomi/Werner 2001).

Research on innovation systems should also focus on regions which are less dominated by high tech industries. By definition, companies in low-tech industries do invest less intensively in R&D. However, this does not mean that opportunities for innovation do not exist. Rather, learning processes seem to be organized in a different manner. For instance, the role of actors involved in these learning processes differs from high tech industries: Innovation in low-tech industries is mainly related to the use of knowledge created in other industries (Palmberg 2001). In order to be able to tap this knowledge, collaboration with KIBS could be of particular importance for low-tech firms. KIBS could therefore "contribute significantly to the dissemination of practical knowledge in applying, embedding, and controlling complex technologies effectively as well as in developing and applying effective marketing strategies" (Schienstock/Hämälainen 2001, 100).

It is the aim of this paper to discuss these issues on KIBS and specific regional innovation systems in order to contribute towards a better understanding of KIBS' role in regional systems of innovation. According to Cooke (1998), RIS are characterized by their specific governance and business innovation structure. The specific function and structure of KIBS belongs to the business innovation structure and it can be assumed that their role might be affected by different local governance structures (Cooke et al. 2000) but clearly might be more affected by the business innovation structure. One core element of the latter is constituted by dominant clusters of local industries. Therefore a region with a dominant industrial cluster was selected for the study (pulp and paper industry (abbr. p&p) in Southeast-Finland). This industrial cluster can be characterised as "low-tech", because it is a traditional resource based industry and R&D efforts are relatively low.

It is expected that this industrial cluster is shaping the structure and function of the local KIBS as well as the local RIS to a large extent. Consequently, this paper is discussing the structure and function of KIBS within this context an provides some empirical evidence for KIBS' strategies of learning and for KIBS' embeddedness in regional systems of innovation. Furthermore, the symbiosis between a low-tech industry (namely p&p) and the significance of KIBS in a peripheral region (Southeast-Finland) will be illustrated.

3 Methodological issues

3.1 Defining knowledge intensive business services

The first difficulty for an empirical study dealing with KIBS firms is actually to identify them on a sectoral level. Because the characteristics associated with KIBS firms are relatively new, such sectors are not yet designed in industrial classifications. Furthermore, characteristics usually associated with KIBS are ephemeral (Werner 2001): They may be present in a firm one year and not five years later. Another difficulty in defining KIBS is the fact that some manufacturing companies are increasingly trying to get into the service business and thus blurring the boundaries between manufacturing companies and service firms (Nählinder 2001).

Table 1: KIBS included in the survey and assignments to different groups of KIBS

Technology oriented KIBS (Miles et al.)		Other KIBS (Miles et al.)
T-KIBS	**C-KIBS**	**P-KIBS**
Research and Development 73101 R&D on medical sc. 73102 R&D on natural sc. 73103 R&D on engin. +techn.	**Computer and related services** 72100 Hardware consultancy 72200 Software consul.+supply 72300 Data processing 72400 Database activities 72600 Other computer related activities	**Legal services and auditing** 74111 Legal advisory 74112 Legal representation 74113 Patents advisory 74119 Other legal activities
Technical services 74201 Town and city planning 74202 Civil engineering 74203 Architectural activities 74204 Structural engineering 74205 Heating, plumbing and air-conditioning design 74206 Electrical eng. design 74207 Other construction act. 74208 Mechanical and process engineering design 74209 Other techn. consult. 74300 Tech. testing+analysis 74841 Industrial design		**Consultancy and labour recruitment** 74140 Business + man. consult. 74501 Employment office act. 74502 Labour rental activities 74509 Other provision of labour
		Marketing services 74401 Advertising agency activities 74409 Other advertising activities

Source: based on Miles et al. 1995; Nählinder 2001; Werner 2001.

Consequently, there is no consensus about the appropriate working definition of KIBS.[3] For the purposes of this study, it seemed most reasonable to identify KIBS firms by using existing industrial classifications corresponding to the European classification of economic activities (NACE) and form KIBS sectors by regrouping these classifications on a five-digit level.[4]

The selection of sectors and grouping of companies corresponds to a great deal to the method proposed by Toivonen (2001) and others (Werner 2001, Nählinder 2001).[5]

To analyse the role of different KIBS firms in innovation systems, it is reasonable to differentiate the KIBS firms in the sample. In the existing literature, there is often a clear distinction between so-called technology-oriented KIBS ("T-KIBS"; Miles et al. 1995) and other, non-technology oriented KIBS, sometimes labelled as "P-KIBS" (Nählinder, 2001).[6] Because of the growth of the IT-sector, some authors add another type of KIBS including computing and software related services (Werner 2001). Here, these companies are labelled "C-KIBS". Table 1 lists all KIBS included in the survey and assigns them to the groups mentioned.

3.2 The survey

The results being presented in this paper are based on a survey of Southeast-Finland's KIBS firms and potential clients conducted in 2002. The survey consists of three parts:

(i) A standard questionnaire was sent to all relevant KIBS in the regions of Kymenlaakso and Etelä-Karjala (Southeast-Finland).[7]

(ii) 20 KIBS firms in Southeast-Finland as well as 5 KIBS firms situated in the capital area of Helsinki participated in semi-structured interviews. In addition, company documentations like annual reports, brochures and other publications have been collected and analysed. The KIBS approached in the interviews were predominantly among the companies with important customer relationships to either wood processing industries (forestry, pulp & paper, wooden products) or to the manufacturing of machinery and equipment.

(iii) In addition, 18 potential clients of KIBS firms in the fields of wood processing industries and manufacturing of machinery and equipment have been interviewed, in order to gather information on the demand side.

4 Role and significance of KIBS for Southeast-Finland's system of innovation

4.1 The region of Southeast-Finland

For the purposes of this study, the surveyed region was territorially defined including two Finnish regions: Etelä-Karjala and Kymenlaakso. Both regions are situated about 100 – 200 km north-east of the Finnish capital Helsinki. Together, Etelä-Karjala and Kymenlaakso correspond to Kaakkois-Suomi (Southeast-Finland).

Kaakkois-Suomi has about 324,000 inhabitants living in an area of 10,724 km², this corresponds to 30.2 inhabitants per km². The total net migration is negative, although there are significant differences between cities. The industrial structure in the region is dominated by the influence of the pulp & paper industry (Karhu et al. 2002). The 59 establishments in the field of p&p account for 44% of value added in the manufacturing sector and as much as 64.8% of the work force in the manufacturing sector in the region. Southeast-Finland hosts 20.8% of all p&p establishments in Finland and nearly one third of all persons employed in Finnish p&p industry.

Despite the concentration of wood processing industries in Southeast-Finland, the level of industrial R&D in the region is relatively low: R&D expenses per capita in the region reach

only 54% of the national average. This can be mainly explained by the absence of R&D intensive electronics industry, which accounts for 62.6% of all R&D person-years in Finland. In contrast, the wood processing industry (including p&p) accounts for only 4% of all R&D person-years and only 2.9% of all R&D expenditures in Finland. Thus, the wood processing industry is usually labelled as a low-tech industry (Palmberg 2001).

4.2 Structure of KIBS in Southeast-Finland

In total, the number of KIBS establishments (by the definition given above) in Kaakkois-Suomi increased by nearly 30% from 1995 to 2000 (Table 2). However, this reflects the general trend in Finland. Table 2 indicates that Finnish KIBS firms are highly centralized in the capital area (Uusimaa). In the year 2000, nearly half of all KIBS establishments were located in this region.

Table 2: Number of establishments in Kaakkois-Suomi, Uusimaa and whole Finland

Type of KIBS	Finland			Uusimaa			Kaakkois-Suomi		
	1995	1999	2000	1995	1999	2000	1995	1999	2000
Computer and related Services	2535	3529	3992	1289 (50.1%)	1771 (50.2%)	2019 (50.1%)	92 (3.6%)	110 (3.1%)	116 (2.9%)
Research and Development	157	241	265	76 (48.4%)	113 (46.9%)	123 (46.4%)	.	1	2
Legal services, auditing	1663	2091	2114	686 (41.2%)	877 (41.9%)	888 (42.0%)	71 (4.3%)	100 (4.7%)	99 (4.7%)
Marketing services	2083	2549	2652	1143 (54.9%)	1385 (54.3%)	1416 (53.3%)	53 (2.5%)	77 (3.0%)	77 (2.9%)
Technical services	6001	7554	7719	2294 (38.2%)	2918 (38.6%)	2980 (38.6%)	344 (5.7%)	402 (5.3%)	412 (5.3%)
Consultancy and labour recruitment	3.453	4.734	4.978	2012 (58.3%)	2646 (55.9%)	2760 (55.4%)	110 (3.2%)	161 (3.4%)	162 (3.3%)
Total	**15892**	**20698**	**21720**	**7500 (47.2%)**	**9710 (46.9%)**	**10186 (46.9%)**	**670 (4.2%)**	**851 (4.1%)**	**868 (4.0%)**

Source: Statistics Finland 2001. In parentheses: regional share in relation to the whole country.

The concentration of services is even higher in terms of persons working in KIBS (Table 3): In 2000, 58.4% of all persons working in Finnish KIBS was located in Uusimaa. The reason for this is that KIBS firms in Helsinki tend to be larger than elsewhere in the country. Despite the huge concentration of KIBS in the capital area, the figures suggest that there has not been a trend towards an even higher concentration of KIBS in the capital area between 1995 and 2000.

Table 2 and Table 3 also indicate that in Southeast-Finland the size of KIBS offering legal services, auditing, marketing and market research is below the national average. For legal services in Southeast-Finland it has to be considered that the figures also include the many law offices serving only individuals, so the number of establishments offering business law services is supposed to be even lower. The only type of KIBS topping the nationwide average in personnel per establishment are engineering and technical consultancy service firms (average 4.5 persons per establishment in Southeast-Finland compared to 3.9 on the national level). This

indicates the comparative importance of technology oriented business service companies in the region of Southeast-Finland.

Table 3: Total number of staff of KIBS in Kaakkois-Suomi, Uusimaa and whole Finland

Type of KIBS	Finland			Uusimaa			Kaakkois-Suomi		
	1995	1999	2000	1995	1999	2000	1995	1999	2000
Computer and related Services	14478	23893	30752	9835 (67,9%)	16171 (67,6%)	20597 (67,0%)	432 (3,0%)	520 (2,2%)	653 (2,1%)
Research and Development	1977	3338	3301	1386 (70,1%)	2067 (61,9%)	1921 (58,2%)	.	.	.
Legal services, auditing	3967	4520	4750	2351 (59,2%)	2780 (61,5%)	3026 (63,7%)	99 (2,5%)	101 (2,2%)	97 (2,0%)
Marketing services	5321	7730	8066	3716 (69,8%)	5320 (68,8%)	5502 (68,2%)	84 (1,6%)	131 (1,7%)	108 (1,3%)
Technical services	22440	28537	30148	10334 (46,1%)	13012 (45,6%)	13528 (44,8%)	1390 (6,2%)	1797 (6,3%)	1836 (6,1%)
Consultancy and labour recruitment	7.714	15.764	18.172	5030 (65,2%)	9655 (61,2%)	11015 (60,6%)	143 (1,9%)	292 (1,9%)	383 (2,1%)
Total	**55897**	**83782**	**95189**	**32652 (58,4%)**	**49005 (58,5%)**	**55589 (58,4%)**	**2148 (3,8%)**	**2841 (3,4%)**	**3077 (3,2%)**

Source: Statistics Finland 2001. In parentheses: regional share in relation to the whole country.

Further evidence upon the relative importance of KIBS in Southeast-Finland can be derived from the headquarter function (Werner 2001). The results of the survey indicate that not all KIBS establishments in the region of Southeast-Finland are independent firms in the sense that they have the company's headquarter in the region: 12% of all T-KIBS, 17 % of all C-KIBS and 28% of all P-KIBS in the sample reported that their local establishment in Kaakkois-Suomi is a branch office. More than 80% of these branch offices have their headquarter in the capital area. It could be concluded that major strategic decisions in these firms are not been made in the region of Southeast-Finland. From the regional system of innovation's point of view, this could be a potential weakness.

4.3 The symbiosis of KIBS and industry in Southeast-Finland

Existing studies on KIBS suggest that the territorial distribution of KIBS corresponds largely to the clustering activities of their clients (Hertog/Bilderbeek 1998). Service firms need to be close to their customers, because spatial proximity between these two actors facilitates interactive learning processes (Reuter 2001).

The results of the study show that this applies to some extend to KIBS in Southeast-Finland, too: 13,6% of all KIBS in the sample are specialized in serving the p&p industry. Another 19% of KIBS in the sample have business relations to the p&p industry, although p&p is not among their most important groups of customers. 67% of the KIBS in the sample reported that they do not have any kind of customer relationship to the p&p industry.

In order to clarify the interrelation between the dominating industrial cluster and the local KIBS the latter have been regrouped into three categories (Table 4). The first group contains KIBS being specialised on p&p ("p&p-specific KIBS"). The second group was formed by KIBS which are not specialized in p&p but sustain general client relations to the industry („non-industry specific p&p KIBS"). The third group includes KIBS which are not related to the p&p industry („non-p&p KIBS").

Table 4: Groups of KIBS according to customer relationships with p&p industry.

Type of KIBS		p&p-specific	non-industry specific p&p	non-p&p	total
T	**Technical services** (excl. architectual and related services)	10 (56.6%)	7 (28.0%)	16 (23.5%)	33 (29.7%)
	Architectural and related services	-	2 (8.0%)	10 (14.7%)	12 (10.8%)
	Research and development	-	1 (4.0%)	-	1 (0.9%)
C	**Computer and related services**	2 (11.1%)	8 (32.0%)	18 (26.5%)	28 (25.2%)
P	**Consultancy and labour recruitment**	5 (28.7%)	4 (16.4%)	10 (14.7%)	19 (17.1%)
	Marketing services	1 (5.6%)	-	3 (4.4%)	4 (3.6%)
	Legal services and auditing	-	3 (12.0%)	11 (16.2%)	14 (12.6%)
	total	18 (100%)	25 (100%)	68 (100%)	111 (100%)

Source: own survey.

Table 4 indicates that p&p-specific KIBS in Southeast-Finland provide most likely technology oriented services (esp. in the field of engineering and other technical consultancy). Results from the interviews carried out with KIBS firms in the region show that for these KIBS the spatial proximity to the pulp & paper manufacturing companies was decisive for choosing the current location of the company. For other KIBS in the sample, however, personal reasons tend to be more important.

Being asked to evaluate their location in the region, there seems to be a clear distinction in the answers between those KIBS with business relationships to the p&p industry and other companies with other groups of customers: the latter tend to emphasis the disadvantages of their location. They complain about the absence of a considerable amount of potential customers in the region, and they tend to point out that it is not easy to expand to other regions in Finland in order to build up new business contacts. The marginal position of Southeast-Finland is not only being recognized in terms of travel times, but also in terms of getting into international networks (and subsequently into international markets): "here it is difficult to get international contacts, everything goes through Helsinki".

The results of the interviews indicate further that the assessment of commercial perspectives of KIBS with business relations to p&p depend on two fundamental developments in the region: The first is related to the trend towards internationalisation in the p&p industry, the second refers to the ongoing process of mergers and acquisition in p&p.

P&p-specific KIBS tend to assess the internationalisation of their key customers positively, because they are expecting to tap new markets through the enlarged network of the p&p firms and thus use the existing contacts to p&p plants in the region as door-openers to the international scene: "if you get the big ones as your reference, then it is easy to get to the other factories, too", as one interviewee explained. Another KIBS company described that the p&p industry was the driving force for altering its own business strategies: "They [the p&p industry; the author] have the demand. And they have forced us to go international!"

The main factor affecting future developments of p&p-specific KIBS and non-industry specific KIBS has to be seen in the ongoing concentration processes within the sector itself. Most p&p mills in the region now belong to one of the international paper giants (esp. Stora Enso, UPM-Kymmene, M-Real). As a consequence, there is a trend towards the relocation of parts of the value chain to Helsinki or other locations abroad (e.g. administration, marketing, consulting, training). This affects related KIBS heavily. Especially KIBS in the field of legal advisory, marketing and business management consulting complain about the discontinuation of customer relationships. As a consequence, the variety of these types of non-technology oriented services in the region is decreasing.

However, p&p-specific KIBS seem to be better off. They notice that the process of concentration in industry creates an increasing demand for innovative solutions: Due to the internal restructuring of business processes the "climate" is changing and the pulp & paper industry seems to be much more aware of the opportunities to implement innovative service solutions. As one interviewee stated: "In the paper mills they were not concerned about cost reduction when it worked well. If it worked, it was enough. People did not see that they could work better and better ... But the 'climate' in the paper companies is changing. There was a change when the pulp and paper companies were taken over by big groups".

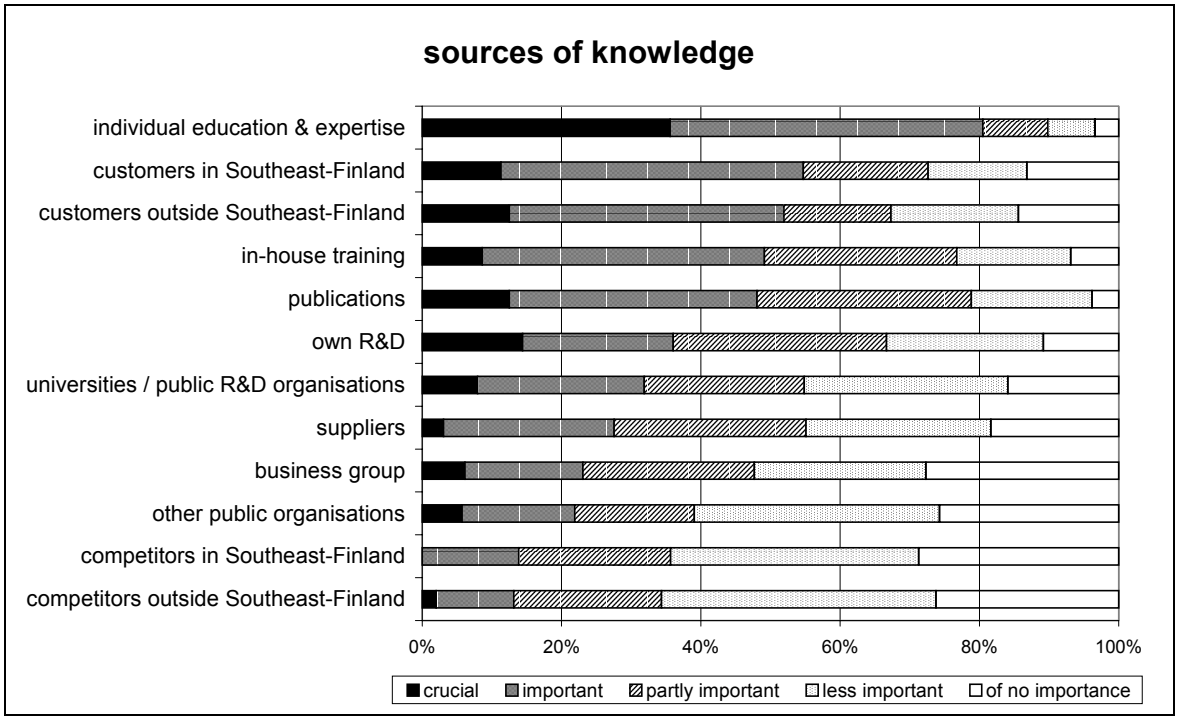
Thus, it can be concluded that the strong national position of engineering and other technical consultancies in the region is due to the region's stronghold and long history in wood products manufacturing. But the mentioned recent developments within the sector have effected local demand for business services. Some of the KIBS like the technology oriented ones regard these trends as positive because of new opportunities. Other are loosing ground and customers because of national concentration trends within their specific segment of services. In the long run there might be the risk that the region's variety of KIBS is declining further. The trend of technological specialisation could create a mono structure of KIBS which is highly vulnerable to international developments. Furthermore, a limited variety of local KIBS could also reduce further development prospects of the whole region, because it is presumed that a regional economy where a diverse KIBS sector has been nurtured would generate a high rate of

innovations (Kautonen 2001). As a matter of fact, the only perspective would be the diversification of the regions industrial base which is not easy to do.

4.4 KIBS' strategies of learning

In order to provide clients with specific knowledge, KIBS have to create this knowledge and absorb new knowledge from external sources. This section brings different knowledge creating and absorbing activities together to examine how KIBS' internal learning strategies vary across different types of KIBS and different kinds of customers.

Figure 2: Evaluation of knowledge sources (N=118)



Source: own survey.

Firms were asked in the survey questionnaire to evaluate, on a scale of 1 to 5, sources of knowledge in terms of their importance for the firm's innovation and service development activities. According to Figure 2, education and expertise of individual employees is the utmost important source of knowledge for KIBS in the sample. This result could be explained by the importance of tacit knowledge for KIBS' services. Tacit knowledge refers to knowledge that is not documented and only available by experts. Because it is very difficult to state in an explicit form (Lundvall/Borrás 1997), it is tied to a great extend to single persons. Therefore, KIBS in Southeast-Finland tend to acquire this type of knowledge by recruiting employees with the appropriate individual education and expertise (Leiponen 2001).

More than 50% of all KIBS mention customers both in Southeast-Finland and elsewhere as a crucial or an important source of knowledge. The importance of customers is suggested by other studies, too (Leiponen 2001). However, the fact that the importance of customers inside

Southeast-Finland and outside the region is weakly correlated (0,43**), suggests that the spatial proximity is less important for learning of many KIBS than previously assumed (Reuter 2001).

However, the sources of knowledge should not be considered separately. Further analysis suggests that the single sources of knowledge are highly multicorrelated. Therefore, a principal component analysis (PCA) was carried out. The principal component analysis demonstrates that the ways of gathering knowledge for service innovations can be reduced to four different strategies:[8]

Table 5: Principal components of knowledge gathering strategies.

	Factor 1 network	Factor 2 science	Factor 3 in-house	Factor 4 recruiting
Competitors in Southeast-Finland	**.80**	.23	-.24	
Competitors outside Southeast-Finland	**.79**	.26		-.15
Customers in Southeast-Finland	**.78**	-.24	.12	.31
Other public organisations	.15	**.85**		-.13
Universities / public research organisations	.19	**.75**		.32
Publications	-.13	**.65**	.31	
Own R&D		.11	**.76**	
Customers outside Southeast-Finland	**.52**		**.65**	
In-house-training	-.16	.13	**.55**	
Individual knowledge of employees	.18			**.83**
Suppliers	.48			-.55
Cumulative	26%	43%	55%	66%

Source: own survey (N=72). Extraction method: PCA. Rotation method: Varimax with Kaiser-normalization. The rotation is converged in 7 iterations. Factor loads lower than 0.1were left out.

The first important way of gathering knowledge is through networks with competitors, customers and – to some extend – suppliers. This strategy is here labelled as "learning within networks". A second strategy of gathering knowledge relevant for innovations is through co-operations with universities and through publications. This strategy is labelled as "learning from science". A third manner of generating knowledge is through efforts *inside* the KIBS firms: they may carry out own R&D or have a strong emphasis on in-house training and learning-by-doing. Therefore, this third category of knowledge is labelled as "learning within the organisation". The PCA results show that this component also loads high with customers outside Southeast-Finland. According to the presumptions about KIBS' learning processes made in chapter 1.2, one can conclude that learning primarily from internal sources also requires external sources as a complementary asset. A forth strategy to gather knowledge is to make use of the individual qualification and the knowledge of staff members: for example, companies may gather knowledge by recruiting new employees with the required expertise. This fourth strategy is labelled as "learning by recruiting staff".

As indicated in Table 6, the learning strategies of KIBS depend on the type of customers KIBS address. The results of the study suggest that KIBS being specialised in providing wood processing industries (forestry, pulp & paper, wooden products) with industry specific

knowledge tend to rely heavily on knowledge created in-house and on learning by recruiting qualified staff. It can be assumed, that for these KIBS own research in combination with acquiring relevant staff with tacit and procedural knowledge is most important. Furthermore, this suggests that the p&p industry in the region focuses on the exploitation of knowledge developed elsewhere, without integrating related external organisations (here: KIBS) deeply into their own internal learning processes. This corresponds to the externalisation-thesis presented in chapter 1.2.

Table 6: predominating knowledge gathering strategies of KIBS, sorted by key-customers

Key customers	KIBS' knowledge gathering strategies
Forestry	recruiting
Pulp & paper manufacturing	in-house recruiting
Wood products manufacturing	recruiting
Machinery & equipment manufacturing	network recruiting
Manufacturing of ICT	science recruiting
Other manufacturing companies	network
Business services	network

Source: own survey, N=71

Surprisingly, learning from science is of minor importance for most of the KIBS companies. Only those KIBS being specialised in providing services for the ICT industry use knowledge provided by universities, polytechnics etc. at a highly significant level. This does not mean that universities are generally of minor importance: Rather, universities and publications are being regarded as a complementary source for acquiring relevant knowledge.

The results suggest, that the significance of customers as a source of knowledge for KIBS varies significantly between KIBS sectors. In particular for p&p-specific KIBS, customers seem not to be the outmost relevant source of getting expertise. For them, other sources like own R&D and especially the recruitment of qualified staff are at least of equal importance.

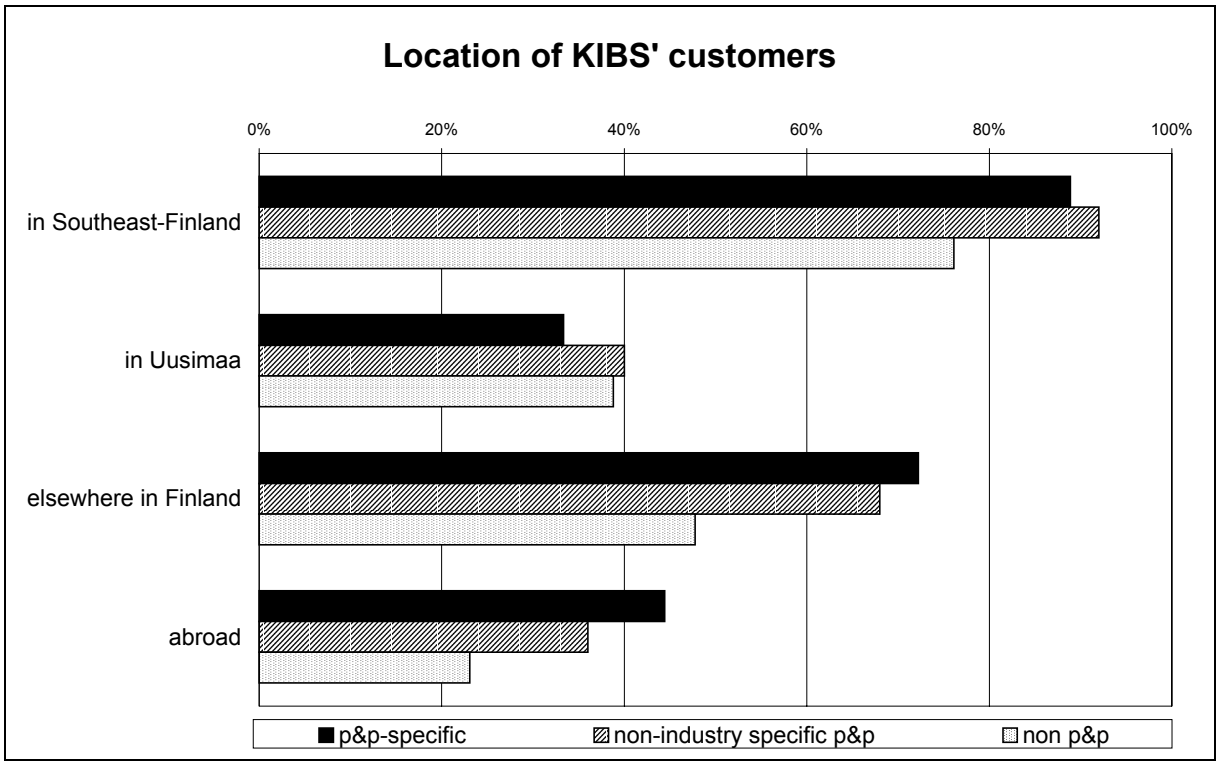
4.5 KIBS as regional bridges of innovation

Existing studies suggest that KIBS can act as an intermediary in order to disseminate knowledge within the regional innovation system. The related results of the survey are discussed under this section. As already mentioned, knowledge can be disseminated by various ways. Explicit knowledge, for example, can be disseminated by writing publications, by sending information via e-mail etc. For tacit knowledge, which is expected to play a crucial role in innovation systems, the dissemination channels are much more different from channels for explicit

knowledge, because this kind of knowledge is tied to the persons carrying it. Mostly, it is only available to experts (Lam 1999; Lundvall/Borrás 1997).

From this point of view, KIBS can contribute to the improvement of the regional knowledge base by dissemination and explication of tacit knowledge in the following ways: Through the collaboration with customers, through a network of co-operation partners (clients, competitors, universities etc.), and through inter-firm and inter-regional labour mobility.

Figure 3: Location of KIBS' customers



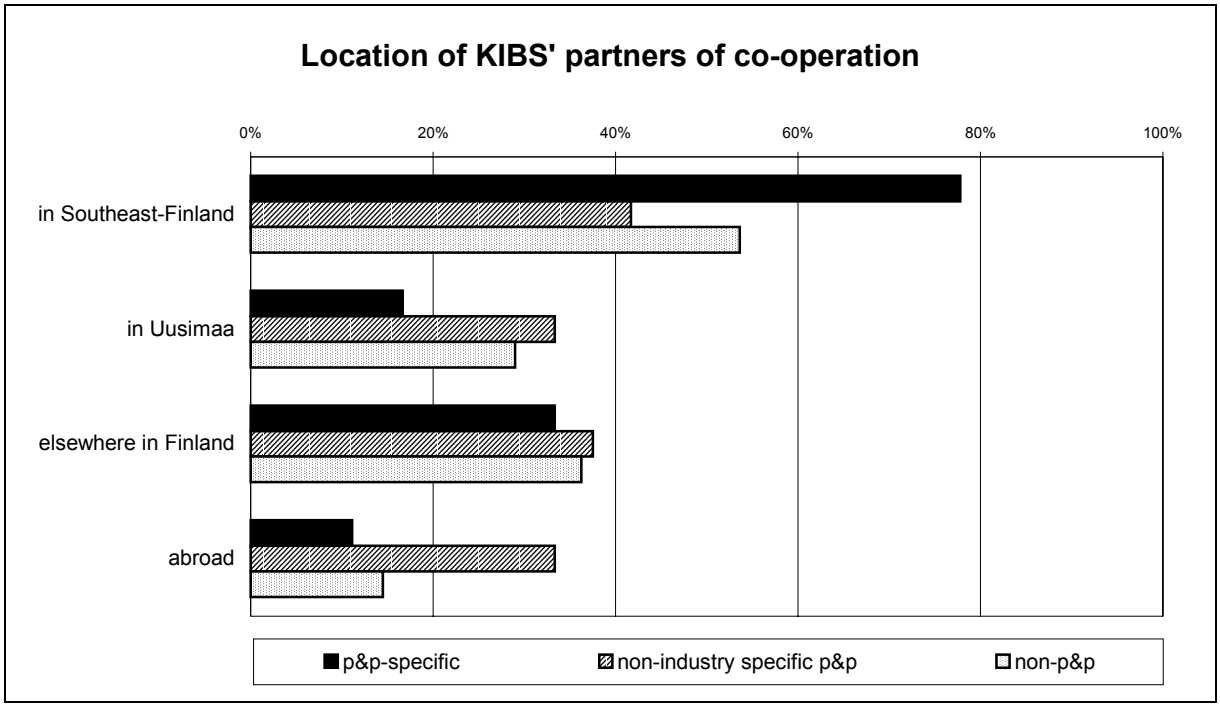
Source: own survey.

Figure 3 indicates that KIBS are embedded in national and regional business systems of different scales depending on the type of KIBS. Although for all KIBS the majority of customers are located in Southeast-Finland, p&p-specific KIBS tend to have more frequent customer relationships to other regions in Finland and to foreign markets than non-p&p KIBS. Hence, it could be concluded that p&p-specific KIBS are much better embedded in national and international networks than non-p&p KIBS and that the services provided by p&p-specific KIBS in Southeast-Finland can more frequently compete on markets above the regional level. One can conclude that KIBS in Southeast-Finland are in most cases very much locally oriented in their customer relationships. From the regional innovation systems' point of view, this could be a potential weakness: if local KIBS' channels of acquiring knowledge are locally limited, it may effect their ability to develop their services and their ability to disseminate up to date expertise to their customers (Cohen/Levinthal 1990; Kautonen 2001).

In general, KIBS in Southeast-Finland seem to co-operate with other actors quite frequently. 72,1% of all KIBS reported that they have some kind of co-operation with other actors. The

share of co-operating companies is highest within the group of p&p-specific KIBS (77,8%). Figure 4 illustrates the territorial distribution of KIBS' partners of co-operation. It indicates that – despite the supra-regional and international orientation of customer relationships – p&p-specific KIBS tend to rely very much on regional oriented co-operations: 78% of p&p-specific KIBS have at least one ongoing co-operation with actors in Southeast-Finland. For other kinds of KIBS in the sample the share of regional oriented co-operation is considerably lower (42% for non-industry specific p&p KIBS and 53% for non-p&p KIBS). At the same time, the proportion of p&p-specific KIBS co-operating with KIBS in other regions and abroad is considerably smaller than the corresponding proportions for other KIBS.

Figure 4: Location of KIBS' partners of co-operation



Source: own survey.

Hence, it could be concluded that p&p-specific KIBS are well embedded in the regional innovation system and well linked to the dominant industrial cluster. They create knowledge in-house (see chapter 4.4) and in close co-operation with local and regional actors. The resulting knowledge products seem to be competitive not only on the regional markets, but also internationally. This results could give further evidence for the externalisation–thesis discussed earlier. For non-p&p KIBS the situation is different. Their customer relationships tend to be much more oriented towards the local and regional markets, while at the same time they co-operate significantly more frequently with partners outside Southeast-Finland (esp. Uusimaa).

Non-industry specific p&p KIBS hold a position in between: The spatial distribution of their customers corresponds largely to the one of p&p-specific KIBS, whereas their co-operations tend to be much more international. From this could be concluded that the different kinds of KIBS fulfil the bridging function in different ways: while p&p-specific KIBS are oriented towards the combination and exploitation of knowledge embedded and created in the region,

other KIBS tend to link clients with knowledge created elsewhere or with knowledge created in collaboration with actors outside the region. In other words, they might act as "antennas" for the absorption of new knowledge created in other regions (Fritsch/Schwirten 1998).

The presumption that p&p-specific KIBS in Southeast-Finland can heavily rely on regional and local knowledge sources is backed by the information given in Table 7. This table illustrates two different facts: Firstly, it shows the share of KIBS having co-operations with different actors. Secondly, it indicates the share of KIBS with co-operation partners in the region of Southeast-Finland (in parentheses).

Table 7: Share of KIBS with co-operations with specific partners

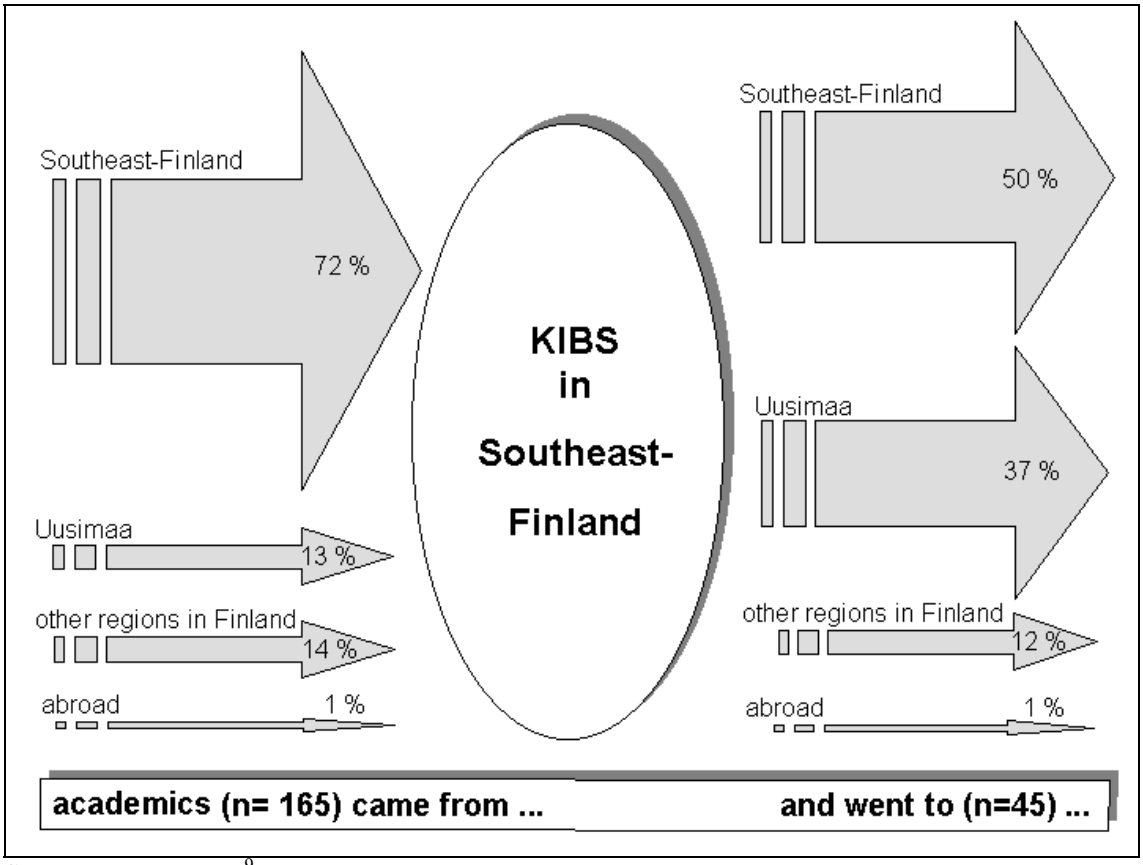
Co-operation partner	p&p –specific KIBS	non-industry specific p&p KIBS	non-p&p KIBS
Wood processing industries (forestry, p&p, wooden products)	28% (100%)	29% (71%)	7% (60%)
Manufacturing of machinery & equipment	22% (100%)	33% (25%)	15% (50%)
Manufacturing: other products	17% (100%)	13% (0%)	15% (70%)
Technical oriented service companies	56% (100%)	54% (46%)	39% (63%)
Non-technical oriented service companies	17% (100%)	8% (50%)	26% (56%)
Public organisations, incl. public research organisations	17% (100%)	17% (75%)	29% (75%)
Universities, polytechnics	22% (100%)	38% (78%)	33% (57%)
Co-operations total	**77,8%**	**66,7%**	**72,5%**

Source: own survey. In parentheses: share of KIBS with co-operation partners in the region of Southeast-Finland.

Table 7 indicates that all p&p-specific KIBS have co-operations with regional actors, while this share is significantly lower for other types of KIBS. Furthermore, it shows the relative importance of wood processing industries and technical oriented service companies in the region as partners of co-operation for p&p-specific KIBS, while the role of the universities as a co-operation partner for p&p-specific KIBS seems rather limited in terms of the frequency of co-operations. Other types of KIBS tend to co-operate more frequently with universities and polytechnics. Thus, there is further evidence that the universities are not of much importance for KIBS being specialised on serving the p&p industry through direct collaboration. However, they might be much more important in terms of providing highly qualified employees, since knowledge creation in p&p-specific KIBS tend to rely heavily on knowledge tied to single persons (as outlined in chapter 4.4).

The third way in functioning as intermediaries by fulfilling the supposed bridging function of KIBS is through the recruitment and dissemination of highly qualified employees. Inter-firm and inter-regional labour mobility of skilled employees is sometimes considered as the most important way of disseminating knowledge between companies in one region (Simpson 1992).

Figure 3: Spatial migration of academics working in KIBS. N=102



Source: own survey.[9]

From the Southeast-Finland's innovation systems point of view, the results were somewhat disappointing: Figure 3 indicates that KIBS situated in Southeast-Finland are not attracting a large bulk of academics from outside the region; it is rather the case that they recruit their staff mainly on the local labour market. This staff is working in the KIBS for a while to become more qualified and to become attractive for KIBS from outside the region. Most attractive seems to be the capital area of Helsinki (Uusimaa). In this sense, local KIBS qualify human capital for external markets.

Summing up, there is some evidence that p&p-specific KIBS in Southeast-Finland fulfil the supposed bridging function in the innovation system by linking both potential suppliers and users of new knowledge in the region. Thus, they enhance the transfer capacity of the first as much as the absorption capacity of the latter. Through the combination of regional embedded knowledge and expertise, a high proportion of these KIBS manages to sell their services to international markets. For doing so, the strong international networks of their key clients described in chapter 4.2 are utilised.

5 Concluding remarks

This article has discussed the function of KIBS in regional innovation systems based on the findings of a survey in the region of Southeast Finland which is traditionally dominated by a cluster of pulp & paper industries. Besides emphasising the general importance of KIBS as intermediaries within a regional innovation system, some empirical evidence was provided on the interrelationship between the dominant industrial cluster and KIBS in the sense that especially technology oriented KIBS (T-KIBS) are closely related to the cluster.

The discussion on KIBS' knowledge generating capacities revealed four dominant learning strategies. Although clients seem to be a very important source of knowledge for KIBS, learning from clients is not a dominant knowledge gathering strategy for all KIBS. Especially p&p-specific KIBS tend to rely very much on knowledge created in their own organisation and on (tacit) knowledge tied to specialists. Therefore, p&p-specific KIBS tend to gather new knowledge predominantly by recruiting specialists with the required knowledge from the labour market. Another result is related to the spatial proximity of knowledge sources: for many KIBS, clients from outside the region are at least of the same importance for learning as clients from inside the region. This indicates that spatial proximity tend to be less important for exchanging knowledge within customer relationships than previously assumed.

Furthermore, the role of intermediaries in terms of knowledge dissemination could be proved. Whereas the technology-oriented p&p-specific KIBS tend to export locally generated knowledge the non-p&p KIBS tend to disseminate externally acquired knowledge within the region. P&p-specific KIBS create knowledge in-house and in close co-operation with local and regional actors.

The case of Southeast-Finland indicates the close interrelation between regional economic structure and corresponding structure of KIBS. Especially the structure of technology-oriented KIBS is highly dependent on the dominant industries. The industrial structure gives way to technical oriented suppliers of industry specific knowledge. On the other hand, the large region-based industrial plants have their headquarters in the capital area or abroad. Because this limits the regional demand especially for non-technological services, it also offers only limited possibilities for expertise other than engineering to nurture. This is especially the case for expertise related to marketing, legal advisory and other non-technological services. The concentration on highly specialised T-KIBS which can even compete on international levels could create some sort of dependency and vulnerability to external shocks.

In general, it became clear that KIBS are playing an important role within regional innovation systems but their role depends very much on the characteristics of the regional economy. Consequently further studies on regional systems are needed in order to generalise the different regional settings. Furthermore, the presented analysis may be considered merely as an introduction. There is an indisputable need to study this topic more in detail. For example, KIBS' internal learning processes have to be studied deeper. In forthcoming studies there is a need to make further use of the interviews carried out with KIBS and their clients.

[1] The following authors deal with KIBS in regional innovation systems: Haas/Lindemann 2003, Hertog/ Bilderbeek 1998, Kautonen 2001, Reuter 2001, Werner 2001.

[2] The term tacit knowledge refers to knowledge that is intuitive and unarticulated (Schienstock/ Hämälainen 2001). It cannot be transferred easily because it has not been stated in an explicit form (Lundvall/Borrás 1997). Therefore, it is only available to experts.

[3] Nählinder (2001) analysed thirteen research reports and research articles and found out that these all use different working definitions of KIBS. What is more, there are several concepts in research literature that are similar to that of KIBS and thus are dealing sometimes with the same type of companies as the KIBS concept does. Examples of such concepts are business services (Hauknes 1998; European Commission 1999), advanced business services (Dahles 1999), professional business services (Hermelin 1997, Nachum 1998), strategic business services (OECD), and knowledge intensive services (Windrum 2000).

[4] This method is quite common with empirical studies on KIBS (Kautonen 2001; Leiponen 2001; Maskell/Törnqvist 1999; Skogli 1998; Toivonen 2001; Werner 2001). One clear advantage is that once one has decided what kind of subgroups should be included in the sample official statistics can be used for identifying the companies. Furthermore, comparing different studies is relatively easy. However, industrial classifications are sensitive to differences in use between countries. Furthermore, it can be the case that firms are registered incorrectly. Werner (2001) points out that quite often companies start as a consulting company, but after a few years they redirect their strategies and services provided, although they remain in the same industrial classification.

[5] Some subgroups were not included in the study: financial services were excluded because banks operate to a considerable extend for private customers. The knowledge intensive, business firm oriented part of their services is not identifiable according to industrial classifications. In difference to the selection proposed by Toivonen (2001), bookkeeping and accounting services were also not included because their services are highly standardised, too. Despite their importance for distribution of knowledge within the innovation system, companies offering training and other kinds of education were also not included in the study, because of methodological problems.

[6] The value of this distinction seems obvious. However, this also creates some methodological problems if one looks at services companies actual provide for customers. The results of the survey shows that a certain percentage of companies are providing different types of services, distorting the results if one makes this distinction on the basis of industrial classifications. For instance, out of 53 technology-oriented KIBS in the survey, 7 (13,2%) also provide computer and software-oriented services and as much as 15 T-KIBS (28,3%) also provide non-technology oriented services.

[7] 1081 KIBS. 27 of which turned out to be invalid respondents. 132 questionnaires were returned, 131 of which could be used for the analysis. Coverage rate reached 12,4%.

[8] For this analysis, the source “business group” was left out, because only 23 KIBS (19%) indicated that they belong to a business group.

[9] In the questionnaire, the KIBS firms were asked to give details about the migration of academics (universities, polytechnics). The timescale referred to the previous five years. The companies were asked about the region academics came from and / or went to and about the branches academics came from and / or went to.

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