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Knowledge-Intensive Business Services as Credence Goods - a Demand-Side Approach

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Abstract: Knowledge-intensive business services (KIBS) constitute a major source of innovative knowledge for small- and medium-sized enterprises. In regional innovation systems, KIBS play a crucial role in distributing innovations and improving the region's overall innovative capacities. While the specific properties and effects on client firms and sectors have been comprehensively discussed, the internal perspective of client firms, i.e. the processes and problems in selecting, using, evaluating and recommending KIBS, has been neglected to date. Using a qualitative approach, we describe the internal mechanisms and problems of SMEs cooperating with various KIBS and discuss the implications for regional innovation systems from a policy-making perspective. We find that all stages of cooperation of SMEs and KIBS are characterized by strong information asymmetries, distrust and uncertainty about the effects of using external know-how, which yields the interpretation that SMEs perceive KIBS as credence goods. While informal networks are used to reduce information barriers, they regularly prove counterproductive by disseminating worst-case examples. Regional policy aiming at developing instruments for fostering innovative cooperation could thus strengthen formal networks that primarily create trust between KIBS and SMEs to systematically reduce mutual suspicions and information asymmetries.

Keywords: credence goods, knowledge-intensive business services, regional innovation system, small- and medium enterprises

JEL-Codes: D21, D40, H25, H40 , L23

1. INTRODUCTION

Two major trends have substantially influenced the growth of advanced economies in the recent decades. Firstly, the increasing relevance of information and communication technologies (ICTs) has led to the restructuring of knowledge-based processes in the organization of information (Laursen and Meliciani, 2010; Papaconstantinou et al., 1998). In this development, the generation and diffusion of knowledge has become essential to modern economies (Cooke and Leydesdorff, 2006; Lundvall, 1992). Secondly, growing competitive pressure has substantially increased the quantitative and qualitative relevance of the service industry. Therefore, service innovations increasingly affect business processes and the growth dynamics of manufacturing and service sectors (Evangelista et al., 2013; Gallouj and Savona, 2009; Millar and Choi, 2011; Sakata et al., 2013).

In this development, organizations serving as innovation intermediaries have a pivotal role (Howells, 2006), particularly those providing research based-knowledge, such as universities, research institutes (Pinto et al., 2012; Tether and Tajar, 2008) and knowledge-intensive business services (KIBS)[1] (Strambach, 2008). The relevance of KIBS has been emphasized with regard to their positive effects on regional innovation systems (RIS) (Cooke, 1992; Doloreux, 2002), serving as innovative intermediaries with particular relevance for small- and medium-sized enterprises[2] (SMEs) (Muller and Zenker, 2001). Consequently, a large number of studies have provided detailed results regarding KIBS' specific capabilities and their impact on RIS (Muller and Doloreux, 2009), following a supply-side perspective in investigating KIBS' economic functions, their mechanisms of adding value and modes of interaction with client firms (Miles and Boden, 1998; Muller, 2001). While this particular focus has substantially furthered our understanding of innovation intermediaries in RIS, we

[1] Miles et al. (1995) provided the seminal definition of KIBS as the part of the service sector with a higher share of academic employees (above 11 % of employees with academic degree or more than 4.5 % of employees with academic degrees in Science or Engineering) providing professional business-to-business services. KIBS constitute a rather heterogeneous sector, which can be divided into two subgroups: professional (p-), include marketing, legal and accounting services; and technological; while (t-) KIBS include information and communication technology services (ICT), engineering, architectural and technical consulting services. Both t- and p- KIBS actively influence knowledge-changing processes in client firms by transferring and implementing know-how (Strambach, 2008). KIBS thus play a major role in innovation processes, which has been broadly discussed in the literature, e.g. by Castaldi et al. (2013); Doloreux and Laperrière (2013); Muller and Doloreux (2009); Tödtling et al. (2006).

[2] In the following, we use the Eurostat definition of SMEs, i.e. below 250 employees overall, medium-sized between 50 and 250, small 10 to 49 employees, and micro firms below 10 employees.

suggest a demand-side approach investigating KIBS' impact on client firms to identify factors potentially complicating KIBS-client interactions and thus hindering the efficient transmission of innovations. Rather than focusing on the cases of successful cooperation with clear innovation effects, an investigation of client firms' incentives, motives and experiences in cooperating with KIBS can help to better understand reasons for success or failure of innovative cooperation within RIS. Drawing on firms' issues in cooperating with KIBS thus enables the derivation of policy implications for the crafting of regional innovation systems that foster innovative cooperation between KIBS and firms. In this paper, we present a qualitative approach using in-depth interviews that focus on the demand for KIBS by client firms and their innovative impact within a specific RIS. We use a sample of 19 SMEs that have had business relations with KIBS and investigate their motivation for the cooperation ex ante, obstacles during the cooperation and the impact of their cooperation ex post. Three case studies highlighting different patterns of cooperation are presented. The results of our investigation are used to derive policy implications for peripheral RIS.

We find that the decision processes leading to KIBS-SME cooperation are driven by a strong uncertainty about the potential outcomes. A general risk aversion or cost concerns hold little relevance to firms; rather, the trustworthiness and reliability of the cooperation partner is the primary concern. In all stages of the cooperation, firms perceive substantial information asymmetries, which limit cooperation ex ante as SMEs face uncertainty about the expected return of cooperation. Interestingly, this uncertainty exceeds the cooperation itself as firms are – ex post – regularly unclear about the gains of using KIBS. This yields the interpretation that the demand-side perspective for SMEs should be interpreted as a credence good situation, which tends to limit innovative cooperation. The lack or ineffectiveness of formal networks leads firms to resort to informal networks to reduce information barriers: while these reduce search costs, they tend to foster the diffusion of previous negative experiences and skepticism towards KIBS, thus precluding potential cooperation. The problems of credence goods and informal networks highlight the relevance of regional policy to systematically support cooperation structures and build trust between firms and KIBS to foster innovative cooperation. We suggest that formal network structures established, controlled and disseminated by regional public institutions, such as chambers of craft and commerce could best serve as a neutral intermediary fostering cooperation and disseminating information on specific KIBS. Their impartial role could succeed in gaining mutual trust between the actors and reduce the impact of negatively-biased stereotypes of KIBS in informal SME networks.

The remainder of the paper is structured as follows. Section 2 provides a review of the relevant literature. Section 3 introduces our methodology and section 4 presents the results and case studies. The results are discussed and linked to regional policy in section 5, before section 6 concludes.

2. LITERATURE REVIEW

A large body of literature has evolved in recent years highlighting the substantial contribution of KIBS to the innovative capabilities of specific sectors, individual firms and RIS.

Overall, KIBS have been emphasized as one of the most innovative sectors within Europe (Rodriguez, 2013; Tether and Tajar, 2008), fostering development by providing knowledge-intensive inputs to client firms that consequently gain competitive advantages. By transmitting codified and tacit knowledge to their clients, KIBS influence the innovation process by producing, transferring and recombining innovations in cooperation with their client firms (den Hertog, 2000). Therefore, KIBS drive knowledge-changing processes and offer produced knowledge (Strambach, 2008), which is positively affected by customers with a high degree of formalized knowledge in the respective field (Koch and Strotmann, 2008). In comparison to the manufacturing sector, KIBS require networks to disseminate innovation due to the highly immaterial nature of KIBS and the requirement of human-intensive interactions (Koch and Strotmann, 2008; Koschatzky, 1999, p. 752). Potential difficulties in using KIBS involve the complexity of cooperation, caused by the high degree of human interaction and learning process required (Martínez-Argüelles and Rubiera-Morollón, 2006; Wood, 2002). Further, the use of KIBS has been described as problematic due to its credence good properties, particularly in the field of legal services and accounting (Kox and Rubalcaba, 2007a; Satzger et al., 2009; van Cruysen and Hollanders, 2008; Camignani and Giacomelli, 2010; Demski, 2007).

The effects of KIBS on cooperating firms has been consistently described as positive, whereby the use of KIBS results in a higher sectoral productivity (Baker, 2007; Camacho and Rodriguez, 2007; Kox and Rubalcaba, 2007b; Oulton, 2001), as well as innovativeness and growth Evangelista et al. (2013). On a company level, KIBS use results in the direct effects of higher R&D output and human capital stock, as well as indirect effects that include the adaption of new technologies and the diffusion of innovation (Miozzo and Soete, (2001). This effect is higher when KIBS are directly included in a firm's innovation management (Doloreux and Shearmur, 2013). In particular, newly founded innovative companies profit

from KIBS due to an increase in innovativeness and the provision of general support during the establishment stages (Mas-Tur and Ribeiro Soriano, 2014).

Different factors fostering a company's willingness to use KIBS in their innovative activities have been discussed. García-Quevedo and Mas-Verdú (2008) state that the use of external knowledge-intensive firms is primarily dependent on the firm's size. Furthermore, the likelihood of external cooperation increases when KIBS are located closer to the client firms (Martínez-Argüelles and Rubiera-Morollón, 2006) and when firms attempt to realize grow (Johnson et al., 2007). Further determinants of different patterns of KIBS use include the ownership structure, the technological complexity of products or services, the human capital stock and the market penetration (Martínez-Argüelles and Rubiera-Morollón, (2006).

Regarding patterns of KIBS use in SME, a positive overall effect has been shown by Muller (2001), who also emphasizes the mutual gains in innovative capacities following an innovative cooperation. For the case of manufacturing SMEs, Shearmur and Doloreux (2013) show the diffusion of technological and managerial innovation through KIBS and the relative independence of KIBS' proximity to the respective firm due to the extensive use of information technology in the course of the cooperation. In an early contribution, (Cohen and Levinthal, 1990) suggest that SMEs have specific barriers to cooperation with KIBS, particularly a lack of resources, the frequent personal adversity of the decision maker and the lack of plans for growth.

Another strand of literature discusses KIBS' vital role in transferring knowledge from an international to a regional level within RIS (Kautonen, 2010). Following the seminal contributions by Cooke (1992) and Cooke et al. (1998) on RIS, KIBS have been shown to lead to competitive regional advantages (Probert et al., 2013; Strambach, 2002); whereby the majority of studies focuses on KIBS' contributions to metropolitan RIS (Aslesen and Isaksen, 2007; Doloreux et al., 2010; Simmie and Strambach, 2006; Wood, 2002), since a lower number of business services are present in peripheral regions (Camacho-Ballesta et al., 2013). Ferreira and Fernandes (2011) emphasize that KIBS spillovers primarily occur in metropolitan RIS. The overall innovative performance of RIS increases with a higher density of KIBS specialized in high-tech services (Rodriguez, 2013) when KIBS are located closer to client firms (Martínez-Argüelles and Rubiera-Morollón, 2006) and with better regional network structures between KIBS (Bettiol and Di Maria, 2013). Disparities between RIS are explained by a lower level of interaction in the generation and diffusion of knowledge between KIBS and firms (Muller and Zenker, 2001).

While few studies have been conducted for peripheral regions, a number of stylized facts have been presented. Peripheral regions are shown to lack the supporting infrastructure and access to human and social capital to successfully establish cooperation, particularly for SMEs (Shearmur and Doloreux, 2009; Tödtling and Trippl, 2005). By contrast, existing KIBS adjust to the regionally predominant industrial sector comprising larger firms (Thomi and Böhn, 2003). Overall, the knowledge transfer and the commercialization of knowledge is considered problematic and ineffective in peripheral RIS (Karlsen et al., 2011). Focusing on structural change in traditional industries, Varis et al. (2012) suggest knowledge-intensive firms as an instrument of regional policy to increase the level of innovativeness in peripheral regions. Thus, KIBS and universities are seen as the most important source of additional know-how in peripheral RIS (Pinto et al., 2012).

We argue that while the literature on KIBS is at a mature state, it should be extended to two important domains. First, the current discussions are primarily focused on the innovation process within KIBS, often using qualitative methods, as well as concerning KIBS' client firms' characteristics and their contribution to subsequent business success, using quantitative measures. However, this emphasis on KIBS' supply side has neglected the effects of KIBS within their client firms, yielding little evidence regarding how and why firms cooperate with KIBS and whether they profit or struggle with the external innovative input. We thus argue that a demand-side perspective can help to understand KIBS' innovative impact by investigating in detail prior decision mechanisms and potential distortions before and after cooperation. While these mechanisms are fairly transparent for large firms with a routine cooperation with external partners, little evidence on the determinants of cooperation has been presented for SMEs. Second, by presenting detailed insight into the ex ante and ex post mechanisms of cooperation, we are able to comment on another aspect of KIBS' impact with little previous research, namely explaining "the extent to which KIBS contribute to the success or failure of regional innovation systems" (Muller and Doloreux, 2009, p. 71). We argue that the capacity of RIS to innovate can be better explained when considering the specific mechanisms through which KIBS and firms cooperate within an RIS. Accordingly, we contribute to the existing literature in two distinct fields. First, we investigate the effect of KIBS on SMEs from a demand-side perspective, before, during and after cooperation. We can thus show the effect of ex ante information asymmetries, what obstacles to innovations occur during cooperation and the ex post effects for innovative activities. Second, we offer implications of our results for the functioning of peripheral RIS, characterized by a small

number of KIBS compared to metropolitan areas. This contributes to the discussions aimed at providing policy implications to increase the performance of RIS.

3. DATA AND METHODOLOGY

We adopt a qualitative approach to more closely examine SMEs' demand for KIBS and their actual influence during and after the cooperation. This allows us to contribute to theoretical considerations on KIBS and draw inferences regarding the role of KIBS in RIS. Since the response rate is - particularly for SMEs - rather low (Newby et al.,(2003) and CEOs in SMEs prefer human interaction rather than anonymous questionnaires (Bartholomew and Smith, 2006), we use a semi-structured questionnaire answered in personal discussions. Furthermore, we argue that conducting in-depth interviews with experts helps to establish a broader theoretical understanding than comparable quantitative approaches in this area (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). Moreover, it also enables us to discuss theoretical concepts in detail without requiring prior knowledge by the CEOs interviewed. Since little theoretical and empirical research has been presented regarding the specifics of KIBS-SME cooperation (Edmondson and McManus, 2007), we follow an exploratory approach without the explicit testing of hypotheses.

The selection process of companies for the participation in our interview procedure is based upon theoretical sampling to fulfill theoretical saturation (Glaser, 1965; Glaser and Strauss, 2008). Participating SMEs were required to have experience in using KIBS and consider innovation as a relevant driver of their business model. The interviews were conducted from May to September 2014 with a sample size of 19 interviews, each with a length of 45 to 90 minutes. Participants had the option to interrupt the recording. Only in one case did the interviewee refuse to record the interview. To develop a realistic understanding of the cooperation between KIBS and SMEs as well as their obstacles, anonymity was ensured to the interviewees. The interviews were transcribed, coded and combined with additional documents (published official company records, newspaper and online research) as a control for the reliability of the interviewees' statements.

The interviews were structured in three parts: first, some initial open questions were asked regarding the interviewees' perspectives on the topic; second, a number of more specific questions were posed concerning the selection process of KIBS by the respective SME; and third, regarding the perceived innovative influence of KIBS on SMEs.

The results were analyzed with the qualitative content approach of Mayring (2004) by reducing the content to relevant parts and conducting a cross-case analysis with inductive codes for aspects newly brought up by the interviewees and deductive codes derived from the literature. To ensure a representative sample, a broad spectrum of companies in terms of number of employees, sectors, market penetration and company location in urban or rural setting was chosen (See Table 1). Finally, the respondents received feedback and preliminary results from the survey for further critique and validation of the results.

Company Coding	Classification	Size	Sector	Market	Gate-keeper	Company Location	Ownership structure
A	Service	Small	Crafts	Regional	LCC	Urban	Family
B	Industry	Micro	Manufacturing	Regional	-	Urban	Family
C	Service	Micro	Trade	Germany	-	Urban	Family
D	Service Industry	Small	Biotech	Worldwide	RES	Urban	Family
E	Service	Micro	Health	Regional	LCC	Urban	Family
F	Industry	Medium	Engineering	Regional	LCC	Rural	Family
G	Industry	Medium	Casting	Germany	-	Rural	Local Shareholders
H	Service	Small	Construction	Regional	LCC	Urban	Family
I	Service	Small	IT	Worldwide	RES	Urban	Local Shareholders
J	Service	Small	Biotech	Worldwide	RES	Urban	Local Shareholders
K	Service	Small	Medicine	Worldwide	RES	Urban	Local Shareholders
L	Service	Micro	Publishing	Worldwide	-	Urban	Family
M	Service Industry	Medium	Steel	Worldwide	LCC	Urban	Family
N	Industry	Medium	Engineering	Worldwide	LCC	Rural	Family
O	Service	Micro	Consulting	Germany	RES	Urban	Family
P	Industry	Medium	Car Industry	Worldwide	-	Rural	Local Shareholders
Q	Industry	Medium	Engineering	Worldwide	-	Rural	Family
R	Industry	Medium	Crafts	Worldwide	-	Rural	Local Shareholders
S	Service	Medium	Biotech	Worldwide	RES	Urban	Family

Table 1. Overview of the sample of SMEs

All firms are situated in a southern region of the German federal state of Lower Saxony, which represents a peripheral RIS characterized by SMEs and only few large companies. Small companies across Lower Saxony have been described as the least innovative across all German states (Berthold et al., 2009). However, the respective RIS comprises a considerably high density of research institutions with international reputation conducting basic research and applied research departments, although the network structure between these institutes and SMEs has been described as rather weak. A large share of the students and academic staff leave the region after graduation due to the lack of job opportunities in larger institutions and corporations (Süssberger, 2011). While Goettingen is part of the metropolitan area of Hanover, Brunswick, and Wolfsburg, the respective local RIS only have little contact.

We initially used gatekeepers from the local chamber of crafts (LCC) and regional economic support (RES) to contact CEOs for the interviews. Later on, we continued using the recommendations of interviewed CEOs to reduce the sampling bias, since the gatekeepers' contact with the SMEs was often based upon publicly supported innovation projects (Probert et al., 2013, p. 1276). Most of the firms are family-owned, while some are owned by local shareholders. All interviewees were CEOs, with the exception of one case, where the chairman of the board was interviewed. The data set includes a broad range of SMEs from a one-man firm to medium-sized companies of 150 employees. Moreover, the level of qualification considerably varies among the companies. While no employee had an academic education in company H (crafts), the vast majority of employees in company D had academic degrees, since the firm operates in a research-oriented environment. The firms operate on a regional, national and international level, yet the national market remains central for the majority.

In the following part, we present our findings regarding the specifics of SMEs' demand for KIBS, as well as the influence that KIBS have on the innovative capability of SMEs and RIS.

4. COOPERATION BETWEEN KIBS AND SMEs

The cooperation between KIBS and SME is based upon SMEs' initial demand for external knowledge-intensive expertise, which mostly requires highly specialized service due to a lack of internal capabilities. This affects firms' capabilities to innovate as the decision to cooperate with KIBS implicitly leads towards open or closed innovation models. Most of the cooperation starts project-based and potentially turns into a long-term relation. We focus on the initial phase of the cooperation and describe the ex ante selection and decision process

within firms and the outcomes in terms of innovative gains from an ex post perspective. All kinds of cooperation are included, i.e. both t-KIBS and p-KIBS. We focus on the projects achieving outcomes that are new-to-the-firm, following the OECD manual's definition. This excludes the large share of KIBS-SME contacts motivated by legal requirements and efficiency-seeking outsourcing.

4.1 Pre-cooperation decision-making

The decision to cooperate with KIBS involves substantial uncertainty for SMEs, since the outcomes of innovation processes are driven by external partners, whose contributions and effects cannot be fully anticipated, even if the service demanded closely matches the service offered. This uncertainty is particularly pronounced for knowledge-intensive firms looking for KIBS, as the high complexity of the product makes an ex ante evaluation of quality and impact very challenging. In turn, KIBS are assumed to have specific information about their product, which firms expect to remain undisclosed to potential cooperation partners.

In the decision-making process, the decision against cooperation with KIBS is often based upon prior stereotypical experiences drawn from the media or informal networks. P-KIBS are particularly shunned due to the conviction that they usually cause detrimental results for SMEs. Consequently, even when firms accept the necessity of using external sources of knowledge, they strongly hesitate to use KIBS due to their concerns about the asymmetric information situation potentially exploited by KIBS. Both non-users and experienced clients of KIBS repeatedly argued that they were "easy targets" due to their lack of know-how in the relevant area of expertise. Furthermore, it can be observed that negative experiences with KIBS of a specific sector quickly lead to the overall rejection of external cooperation. Accordingly, the probability of firms deciding against KIBS for innovative projects is rather high, as the potential risks are perceived as being high.

Particularly for SMEs, the lack of financial resources and risk aversion could be expected to prevent cooperation with KIBS ex ante. However, the financial aspect was considered less problematic by firms, as planning was only conducted in the first place if financial gains from the cooperation were expected. Moreover, firms' financial assets and access to credit were considered unproblematic. SMEs' risk aversion played a significant role, although no general risk aversion regarding spending resources on external projects was observed. Instead, the risk aversion was high due to the perceived information asymmetries connected to the use of KIBS.

Overall, the decision process by SMEs was primarily driven by strong uncertainty about potential outcomes of cooperation and previous dismal experiences with KIBS spread in informal networks. The general risk aversion and cost considerations were secondary aspects to firms. Firms emphasized that the trustworthiness of KIBS and the expected profit ultimately determined whether cooperation was sought.

4.2 Pre-cooperation selection process

The selection process of homogenous standard services is largely driven by prices as quality signals, whereby higher prices indicate a higher quality. By contrast, more complex b2b services tend to be experience goods, whose quality can only be assessed with substantial search costs or after the cooperation. The interviewed SMEs cope with the issues of high search costs and quality uncertainty by accessing informal networks. All firms emphasized that their selection process was primarily influenced by informal contacts ranging from business contacts to close friends. In the SMEs, the responsibility for communication with KIBS mostly relied on few employees and in the small companies regularly on the CEO. Accordingly, the quality of the KIBS selection ultimately depended on the range of the CEO's informal network. Typically, firms initially contact KIBS personally known to the CEO; otherwise, networks partners were asked for a recommendation of a suitable KIBS firm. Firms subsequently compared different recommendations and in some cases asked the respective KIBS' previous customers for their advice. Finally, when meeting the potential cooperation partner, the decision-making was primarily based upon the perceived competence and trustworthiness, as well as personal sympathy for the representative. Ultimately, firms emphasized that the core requirement for a successful cooperation with KIBS was a sense of trust in the business partner due to the high degree of personal interaction required in the process. In the process of selection, the category of trust in the informal network was the core dimension for all interviewees and the information asymmetry connected to the cooperation was seen as the main issue. Thus, all firms attempted to establish personal communication and trust before agreeing to cooperate, whereby often more than one meeting was conducted to build up trust between ranking staff of the respective SMEs and KIBS. This approach was seen as the primary means of reducing the risk of cooperating with an external firm and ensuring a successful outcome. Due to the focus on trust and personal contact, the selection of KIBS is highly dependent on SMEs' ability to establish or access informal networks. For

smaller firms, the ability to cooperate with KIBS is thus narrowed to the personality and individual contacts of the CEO.

This emphasis on personal characteristics of CEOs in SMEs is aggravated by the specifics of a peripheral RIS. Due to the lack of formalized support and cooperation within this RIS, more effort has to be devoted to the initiation of novel contacts with KIBS by firms. Therefore, both the initial search costs and the costs of establishing mutual trust to overcome informational asymmetries have to be borne by individual firms. This constitutes a major obstacle to additional innovative cooperation as the costs may be perceived or actually be prohibitively high. By contrast, a well-established formal or informal network reduces these costs and their perception by SMEs. In peripheral RIS, the cost of sharing information within networks is higher due to the lower number of network participants, which substantially reduces the likelihood of cooperation between KIBS and SMEs. Rather, ad hoc networks that depend on the CEO's individual propensity are used to initiate cooperation.

4.3 modes of cooperation – case studies

Our interviews suggest that the strategies of coping with the uncertainties of cooperation with KIBS vary among SMEs, which results in different innovation strategies. We present three distinct cases that illustrate the different approaches to KIBS-SME cooperation. The first case demonstrates the use of KIBS limited to non-innovative purposes, as well as the application of a closed innovation business model to protect innovations. In the second case, a firm with only limited experience with KIBS provides an example of a disruptive innovative influence due to the first external cooperation. The third case describes a SME that frequently cooperates with KIBS and routinely deals with the uncertainty, whereby an incremental innovative influence is observed.

4.3.1 Closed innovation model

Company A was founded in 1979 as standard electrical service for households. Within its expansion, it first started providing home security equipment and subsequently extended its activities to renewable energy and energy efficient solutions for housing. The most recent addition to their products has been energy efficient lighting systems for houses. The small-sized firm's new strategy was to focus on dynamic markets and adapt to the swiftly changing

market, while their products and services are focused on the needs of demanding technology-friendly customers.

The firm uses external KIBS for tasks related to accounting, legal consultancy and ICT, yet distinctly limits external cooperation to tasks that the CEO considered not to be crucial, i.e. unconnected to the firm's ability to innovate. Furthermore, the use of KIBS is mostly involuntary to conform to external requirements, such as state regulations for legal services and specific demands by customers. The CEO deals with KIBS in person and relays the information to his employees. While he does not have experience with the use of KIBS for innovative purposes, he has a skeptical attitude based upon information provided by business partners, newspapers and friends, which have led to a general avoidance of KIBS. Furthermore, the interviewee emphasizes the fear of unwanted knowledge spillovers and the need to protect the firm's existing innovative capabilities. Information required for innovations is thus obtained through various personal contacts and the internet. Regarding essential cooperation, the CEO underlines that his main goal is not to identify and select the best company with the most innovative ideas, but rather to find the most reliable one that causes the least effort for the SME. For this reason, long-term relations are maintained, including some for 20 to 25 years. The barriers to changing the KIBS are considered high, and thus even disappointments with established cooperation partners are accepted.

The innovation strategy of company A in using KIBS avoids the search costs and potential frustration with KIBS by refusing to open up to external services altogether. KIBS merely fulfil a supporting function for the firm, thus enabling the SME to concentrate on their core competences, which limits the function of KIBS to knowledge transfer. The considerations and strategy of company A illustrate the relation to external innovative service providers represented by a relevant share of SMEs in our sample.

4.3.2 Initial experience in using KIBS

The second case involves a family business, company H, operating since 1919 in the fourth generation, mainly on regional markets. After being launched as a small-sized low-tech craft and painters company with expertise in the housing sector, it began to look for new markets and ways to acquire new segments of customers around 2000. With competitive pressure increasing from companies in other EU states, its new strategy was to offer additional services to their traditional products and services. Similar to the first case, company H initially only used KIBS for outsourcing purposes such as IT services and legal consultancy. The decision

to cooperate with KIBS for an innovative project was a consequence of the CEO's goal of acquiring new markets. The cooperation was established with an engineering t-KIBS closely connected to the university, which resulted in a consultancy concept and a related publication serving as an extension to their traditional products.

The impulse of initiating the cooperation has been motivated by the observation of unsecure future markets and the implication that changes in the business model were necessary. The CEO originally attempted to add services with a scientific background, yet soon realized that the firm's level of know-how was insufficient and thus recognized the demand for external expertise. The selection process was based upon an informal network, although the CEO had already become familiar with KIBS through events of a formal network. Thus, prior information obtained through his informal network was the fundamental reason for starting the cooperation. Although the first contact with the KIBS happened within a formal network, the cooperation started on an informal basis after the CEO had already left the respective network. The CEO emphasizes that formal networks were only used to get in contact with potential business partners, while the actual KIBS-cooperation was initiated on an informal level to reduce the risks associated with the first substantial cooperation with an external service provider. To ensure the cooperation's success, a number of meetings were conducted with the employees engaged in the project, which generated a sufficient degree of trust in the KIBS from the firm's perspective. Nevertheless, the CEO admitted that the cooperation generated risk that was not calculable for the firm due to the lack of experience in these specific forms of cooperation. It was assumed that these uncertainties and information barriers could be eliminated during the course of the cooperation. However, this has only partially fulfilled, as the assessment of the cooperation's quality and success was not entirely possible ex post.

The interviewee emphasized that the first cooperation with KIBS determined his subsequent cooperative behavior and strongly argued that a negative experience would have led to an end of cooperation altogether with this specific KIBS sector. The ex ante and ex post uncertainty and the firm's inability to adequately assess the risks of using KIBS thus makes the results of the initial contacts crucial for the CEO's future decisions. It also fosters a preference for KIBS connected to public institutions rather than fully private firms, in which the risk of knowledge spillovers is considered higher. Thus, while company H openly searches for additional contacts that enabled innovative cooperation, risk and uncertainty aversion substantially limits the scope and future potential for KIBS use.

4.3.3 Routine in using KIBS

Founded in 1936, company P is an established expert in the metalworking industry as a medium-sized supplier to car manufacturing with a focus on international markets, mostly highly qualified employees and a R&D department. Innovation is mostly driven by the requirements of the car industry and to gain competitive advantages on the process and organizational level.

Since company P's market is highly competitive, it regularly uses all fields of KIBS. The executive board supports the employees in their cooperation with KIBS and all parts of the company are subjects of the resulting optimization processes. The use of external knowledge is considered an inherent part of the routine in the innovation process. In the interview, the CEO wondered about the relevance of the topic, since KIBS were an essential part of the regular development of the firm's products and services.

The primary internal driver for cooperation is the firm's R&D unit. The financing of cooperation projects is regarded as an insignificant factor since it is acknowledged as substantially improving innovative capabilities. Negative experiences resulted in the change of partner KIBS, although this produced no doubts concerning whether cooperation with KIBS should be terminated indefinitely as it was continued to be seen as vital and indispensable. Long-term relations are considered optimal for research cooperation with KIBS, because switching costs are considered high. However, in practice, the cooperation of company P with KIBS reflects a mixture between project-based and long-term relations. The selection process of company P is strongly influenced by the use of informal networks. Additionally, formal networks are used to obtain additional contacts and extend the informal network. The intensive use of formal networks is explained as resulting from the company's peripheral location. A high degree of external cooperation is thus seen as indispensable since innovation in their sector is driven by the demands of larger automotive firms. This creates another incentive to cooperate in formal networks and apply a cooperative research design.

Intense human interaction is required during the cooperation with KIBS, even involving the CEOs of both project partners. On a technical level, the communication with KIBS is undertaken by the employees who run the respective project with the KIBS firm. The highly specialized knowledge in the firm's field is a preliminary requirement for cooperation, which is only allowed if the KIBS' representatives are considered trustworthy. For example, the cooperation with a private research institute lasted for more than 20 years, yet ended when the professor in charge of the cooperation retired. Due to the lack of trust, company P decided not

to continue the cooperation, despite facing severe difficulties in finding a similar cooperation partner. Mutual trust is a prerequisite for cooperation and compensated the difficulty in estimating the quality level anticipated by its prospective cooperation with a KIBS. Thus, a general risk aversion does not hinder cooperation, since company P is confident that their experience in trust-building procedures ensures a good selection and cooperation, leading to incremental innovative progress.

The case of company P demonstrates that frequent users of KIBS are similarly influenced by the difficulties of uncertain information at the different stages of cooperation with KIBS. However, cooperating with KIBS is indispensable to the firm, whereby measures to reduce search costs and uncertainty to build up mutual trust are taken. The respective firm makes extensive use of formal and informal networks to gain pre-cooperation information and distinctly aim at establishing reliable long-terms cooperation characterized by mutual trust. This strategy results in incremental innovation due to the successful innovation transfer from KIBS and its indirect transformative influences on the firm.

5. DISCUSSION

Our results can provide a better understanding of firms' perceptions of KIBS and the specifics of their demand for cooperation. The role of KIBS differs between the use of KIBS with no innovative effects and those with direct innovative effects. All of the companies interviewed used KIBS for non-innovative purposes, such as the outsourcing of production processes or connected to legal requirements, which can have indirect effects on innovative capacity through a more efficient use of resources (Görg and Hanley, 2011; Martínez-Argüelles and Rubiera-Morollón, 2006). In SMEs cooperating with KIBS for innovative purposes, the transfer of innovation was considered more important compared to the recombination of knowledge by KIBS. Therefore, the innovative influence on regular KIBS users appeared to be incremental and the result of a routine learning process. By contrast, the firms with only little experience in using KIBS perceived the cooperation as rather disruptive.

Despite examples of successful cooperation with little frictions in all stages of the cooperation, our results suggest that the demand side is strongly driven by a credence good situation, particularly for SMEs. Three aspects concerning innovative projects with KIBS point to credence goods characteristics. Firstly, in the cases where cooperation did not yield a profit or even a loss, the respective CEOs were unable to explain why the positive expectation could not be fulfilled after the end of the cooperation. Secondly, the experience of the CEOs

reflects that the contracts fail not guarantee control – neither overall nor partial – over the behavior and performance of KIBS during cooperative projects. A particular aspect of this was KIBS' communication, which was criticized as being too theoretical and lacking understanding of the specific practical problems within SMEs. Furthermore, the immediate responsibilities for implementing proposed changes and the complexity of the measures were criticized as being hardly controllable, as was the danger of knowledge spillovers via KIBS. Thirdly, firms emphasized that they were unable to assess the quality of the measures taken and the exact gains from the cooperation ex post. The extensive asymmetry of information observed both before and during the cooperation warrants the interpretation that KIBS are credence goods. SMEs regularly struggle to cope with the situation of asymmetric information and a resulting lack of control when cooperating with KIBS, which has a substantial influence on the decision and selection process, often leading to a general decision against seeking external innovative cooperation. The credence good situation thus shifts the demand for KIBS to non-innovate purposes or ultimately - in the case of prohibitive information barriers - precludes KIBS use altogether. This characteristic of KIBS use has been suggested theoretically and empirically (Kox and Rubalcaba, 2007a; Satzger et al., 2009; van Cruysen and Hollanders, 2008), with particular emphasis on legal services (Camignani and Giacomelli, 2010) and accounting (Demski, 2007). Our results lend support to these studies, providing qualitative evidence for this interpretation of KIBS-SME relations.

A common reaction to the credence good problem is to resort to informal networks to reduce information barriers. While this reduces search costs and contributes to the effectiveness of the respective RIS, it also leads to the swift diffusion of negative experiences, which precludes future cooperation. Our results illustrate the crucial role of CEOs in smaller companies that often rely on stereotypes and skeptical attitudes regarding external innovation cooperation. Thus, the reliance on informal networks in peripheral regions might ultimately contribute to reduced innovative activities among firms.

Another reaction to the lack of trust in KIBS - particularly for smaller companies - is to resort to public consulting. In the case of Germany, public institutions also offer knowledge-intensive services for SMEs in some KIBS sub–sectors like R&D, consultancy and education services. Djellal et al. (2013) show that public KIBS in fact contribute considerably to the capacity of innovation systems to innovate and act as gatekeepers in networks for private KIBS by promoting contacts. The choice of public or private KIBS is influenced by the credence good situation observed in our sample, since many SMEs place more trust in public

services such as regional chambers of commerce or chamber of crafts. Interviewees emphasize that the fear of knowledge spillovers and the expectation of longer, more stable cooperation are the central reasons for the appreciation of public over private KIBS. For instance, company A generally refused to cooperate with private R&D consultancies for the fear of losing core innovations to competitors, yet worked with the public chamber of crafts on a regular basis due to its institutional and personal stability, which generated trustworthiness. However, this strong preference for public KIBS is limited to micro and small enterprises in our sample.

These results have consequences for our understanding of the role of KIBS within peripheral RIS. The concept of KIBS in RIS is based upon the idea that an innovative distributor of academic knowledge fosters learning processes and thus provides long-term competitive advantages to client firms. The efficient distribution of knowledge subsequently increases the innovative performance of all firms within the RIS. However, our results show that this mechanism cannot be universally assumed, particularly in peripheral RIS. Owing to a number of factors concerning increasing uncertainty, the systemic influence of KIBS on the innovative capability of the entire RIS is lower than expected from a theoretical perspective, which has also been suggested by Tether and Tajar (2008). While informal networks are used to gather information more efficiently, the reach of these networks is limited and also regularly works against further cooperation due to the spreading of skeptical attitudes and individual negative experiences. Smaller firms in particular shun the uncertainties of using KIBS and tend to either refuse cooperation altogether or stick to the established public service providers. Thus, the spreading of innovative ideas - particularly from academic sources - is severely limited by firms' inability or unwillingness to cope with the risks and uncertainties of cooperation with KIBS.

This leads to distinct policy implications for the design of regional innovative systems. The core function of regional policy would thus be to reduce the credence good situation for SMEs to foster cooperation with KIBS. The core requirement for reducing the issue of uncertain prospects of cooperation would be the provision of detailed information and best practice examples on available KIBS services to SMEs. This informational networking would need to be undertaken by public institutions, such as chambers of commerce or craft, as they are considered impartial institutions by SMEs. By providing a larger formal networks that aims at integrating SMEs in terms of information on KIBS, a formal approach could somewhat replace the informal networks that are often dominated by negative stereotypes and

experiences with KIBS. The establishment and maintenance of a newly fostered formal informational network on KIBS would necessarily be state-funded in the case of peripheral RIS. The resources available for the gathering and provision of information are obviously limited in a business environment dominated by SMEs that are often skeptical of the prospects of innovative cooperation. Particularly when few larger international corporations constitute the center of a RIS, even higher competitive pressure will not lead to stronger innovative cooperation due to problems associated with the credence good situation. Thus, to overcome a cooperative stagnation in peripheral SME networks, the public funding of formal network efforts appears to be a core requirement to initiate a critical mass of successful KIBS-SME cooperation. Once a certain level of cooperation within both formal and informal networks has been achieved, cooperation might become self-supporting, although the initial reduction of uncertainty through extensive information provision justifies state subsidies in peripheral RIS.

6. CONCLUSION

Within the literature discussing the increasing relevance of ICT in the structure of modern economies and the growing relevance of external service industries for firms, KIBS research holds a prominent role. However, while the specifics of KIBS and their effects have been highlighted, the internal perspective of client firms has been neglected to date. This is problematic for policy-makers considering how to improve RIS by fostering innovative cooperation between SMEs and KIBS. We provide an internal perspective on SMEs' decision-making and cooperation patterns to further our understanding of KIBS from the demand side, as well as providing policy implications, particularly for peripheral regions.

We find that cooperation at all stages is characterized by strong information asymmetries between KIBS and SMEs, which leads to the interpretation that KIBS use has credence good properties for SMEs. The uncertainties associated with using external knowledge for innovative purposes often lead to substantial distrust in KIBS, which manifests in informal networks and rather discourages future innovative cooperation. Thus, cooperation within peripheral regions can deteriorate due to the dissemination of worst-case examples and widespread skepticism of SMEs' decision-makers. To alleviate the credence good difficulties for SMEs, regional policy should foster the dissemination of information by regional chambers of craft and commerce. These state institutions are perceived as neutral and disinterested in making a profit by exploiting information asymmetries. Consequently, such

chambers should extend their efforts to maintain formal networks including smaller firms and KIBS to provide comprehensive information and experiences of previous cooperation. This could strengthen mutual trust between firms, which is been emphasized as the key prerequisite to successful cooperation with KIBS. Thus, drawing upon the interpretation of KIBS as credence goods to SMEs, policy-makers in peripheral RIS should focus on establishing structures that succeed in the impartial provision of information and the building of trust.

Obviously, there are a number of limitations to our study. Most importantly, our sample suggests fairly unanimously that KIBS are seen as a credence good by SMEs due to their limited experience and reliance on potentially biased informal networks. However, this might be a region-specific effect of the peripheral region that we investigated. Thus, our interpretation of the credence good problem requires additional empirical testing to exceed the exploratory scope presented in this paper. Furthermore, the distinct perception and trust in public and private support appears to be a fruitful field for future research. Given that trust is the core requirement for innovative cooperation and that informational asymmetries discourage the use of external knowledge, publicly funded innovation support might be a viable alternative for specific RIS. However, other policy instruments that effectively build up trust between KIBS and firms and reduce their reluctance to cooperate should be investigated further.

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