

## In the vanguard of openness : which innovation capabilities should KIBS focus on?

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**In the vanguard of openness:  
Can KIBS substitute their internal innovation capabilities?**

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**ABSTRACT**

Helping other firms to innovate, knowledge intensive business services (KIBS) are studied heavily for their role as knowledge brokers. Less often, scholars have examined how innovation within those companies is affected by the fact that they are so open. A particularly interesting issue is the connection between openness and the need to develop in-house innovation activities. Inspired by the notion of the innovation value chain, recent studies started to assess the relevance of external parties during the distinct phases in which knowledge is translated into business value. For inherently open firms like KIBS, it remains unclear to what extent internal innovation capabilities are still needed when there are possibilities to rely on the knowledge and competences of others.

Building on a literature review and one in-depth case study, we argue that a KIBS' internal capabilities for achieving service innovation lose their value as the KIBS engages in higher degrees of openness. Since external partners can particularly contribute to the explorative and exploitative aspects of service innovation, it solely remains valuable to have an internal capability for the intermediate translation of raw ideas into marketable service propositions. Regression analyses on survey-data from 142 Dutch KIBS show that openness indeed only has an interaction effect with the capability of conceptualizing. By contributing to literature on open service innovation, we demonstrate the existence of a functional limitation in substituting innovation capabilities for openness.

**Keywords:** openness, KIBS, innovation capabilities, innovation value chain, service innovation

## 1. Introduction

Although innovation scholars have a long history of studying topics like external knowledge search, partnerships, networking and inter-organizational learning, the interest in openness has raised enormously over the past decade (Gassmann et al., 2010; Laursen, 2012). A major question in this research field concerns its connection to in-house R&D (Dahlander & Gann, 2010; Cassiman & Veugelers, 2006). On the one hand, scholars argue and occasionally show that internal R&D capabilities can leverage the value of external knowledge sourcing (Chesbrough, 2006; Vandevrande et al., 2009; Caloghirou et al., 2004). This complementarity is in line with the idea of absorptive capacity (Cohen & Levinthal, 1990). On the other hand, several authors point at the downside of engaging in both internal and external R&D activities (e.g. Love et al., 2013). Here, the main argument for substitutability is that engaging in both activities is costly (Laursen & Salter, 2006; Leiponen & Helfat, 2010): having internal innovation capabilities reduces the need for relying on external knowledge and competences (Roper et al., 2008; Love & Roper, 2001).

Given these contradicting dynamics, a research tradition emerged in which authors followed a rather quantitative approach when trying to identify an optimal level of openness (e.g. Laursen & Salter, 2006; Berchicci, 2013). Only recently, scholars started to explore the mechanisms that underlie open innovation in more detail (Hsieh & Tidd, 2012). A notable and promising example is the study by Love et al. (2011), in which knowledge sourcing activities are related to the distinct phases of the innovation value chain (Hansen & Birkinshaw, 2007; Roper et al., 2008). Assessing the relevance of external parties during the acquisition, transformation, and application of knowledge provides fertile grounds for advancing our understanding of the limitations of openness: which are the aspects of innovation that better remain closed (Dahlander & Gann, 2010; von Zedtwitz & Gassmann, 2002)?

How firms can benefit from openness is believed to differ per technology and industry (Christensen et al., 2005). The question of complementarity and substitutability is particularly interesting in the domain of knowledge intensive business services (KIBS). Already in 1990, Richard Barras noted that business services form the forefront of novel modes of innovation. The service revolution he wrote about two decades ago is all the more prominent in current times, as firms from virtually all sectors try to escape the commodity trap by opening up the innovation landscape and adapting service-oriented business models (Chesbrough, 2006, 2011; Mina et al., 2014). Whereas the ‘interactive innovation process’ Barras discussed concerned alignment between various elements of techno-economic paradigms, subsequent studies have investigated the topic more literally by studying how service innovation arises from intensive client interaction (e.g. Edvardsson et al., 2001). Contrary to those firms where open strategies are really an alternative to traditionally closed models, KIBS operate practically always in close interaction with their customers as well as with other parties (Den Hertog, 2000; Leiponen, 2005; Tether & Tajar, 2008). The fact that daily activities by KIBS firms involve such extensive knowledge brokerage begs the question how openness affects (the relevance of) their own abilities to innovate. Recent contributions show that KIBS engaging in knowledge sourcing and R&D activity are more innovative (e.g. Mansury & Love, 2008; Leiponen, 2012), but until now the interaction of these key factors has hardly been investigated.

Generally, studies on innovative search and openness amongst service providers are found to be rare (Leiponen, 2012; Mina et al., 2014). Whereas most of the existing research on complementarities tends to investigate openness in relation to R&D investments or R&D capabilities, these concepts have only limited relevance in the domain of KIBS (Drejer, 2004; Leiponen, 2005). Service providers, be it knowledge intensive or not, are known for formalizing their innovation efforts only occasionally (Miles, 2007). The observation that they (somehow) do develop new services has led to an increasing interest in the innovation activities of service providers (Gallouj & Savona, 2009). One result is the development of an alternative for gauging how able and prone a KIBS firm is when it

comes to innovating. Rather than sticking to formalized R&D, scholars are urged to study innovation in services by adopting the broader notion of dynamic capabilities (Teirlinck & Spithoven, 2013; Den Hertog et al., 2010). Depending on how dynamic service innovation capabilities (DSICs) are operationalized, they can be related to the phases of the innovation value chain (Janssen et al., 2014a). So far, empirical exploration of the respective influence of DSICs on innovativeness and innovation performance is not available, and also the combination of dynamic capabilities and openness has hardly been touched upon (Vandevrande et al., 2010).

This mixed-methods paper aims to inform KIBS firms who face the decision whether to develop their own innovation capabilities or to rely on the skills and competences of external parties (be it through on-the-job learning or deliberate collaboration). Building on a case-study as well as earlier studies on the role of openness during the different stages of knowledge transformation (Love et al., 2011; Lehrer et al., 2012), we argue that openness can substitute internal capabilities for both the explorative and exploitative aspects of service innovation, but is of less relevance for the intermediate translation of raw ideas into marketable service propositions.

The quantitative investigation we present subsequently is based on data from a survey deployed in the Netherlands. An initial exploration of the data, in which five key DSICs are regressed on innovativeness, reveals that the capability to sense user needs is not discriminative for KIBS. This implies that developing a customer-focused sensing capability, as opposed to sensing (technological) options, is hardly complementary to KIBS firms' common tendency to interact with clients. All of the other capabilities are positively and significantly related to innovative output. However, only for conceptualizing we encounter a significant interaction effect with openness (deliberate partnerships). This finding suggests that KIBS firms can benefit from purposive knowledge sourcing - it relaxes the need to build innovation capabilities - but should consider keeping their conceptualization capability internally. Our contribution lays in the demonstration of a functional limitation to substituting innovation capabilities for openness.

## **2. Theory**

### ***2.1 The innovation capabilities of KIBS***

According to the resource-, and knowledge-based view on economic and technological change, firms need to develop certain capabilities in order to translate knowledge into business value (Barney, 1991; Teece et al., 1997). These capabilities allow firms to sense developments and acquire promising ideas, transform them into new propositions, and reconfigure their organization so that the new offering can be commercialized (Teece, 2007; Zahra et al., 2006). Therefore, dynamic or innovation capabilities are commonly regarded as important antecedents for the renewal of both firms as well as the products and services they deliver (Crossan & Apaydin, 2010).

Due to its traditional focus on technological innovation, studies on openness tend to be biased towards R&D capabilities. Especially in the understudied-field of services, however, performing the processes that generate novel combinations of knowledge entail more than the availability of capabilities bound to R&D (Miles, 2007). Service innovation is argued to depend primarily on individuals' skills and professional knowledge, rather than on the narrow (and relatively rarely encountered) set of activities that fall under formalized R&D (Leiponen, 2012). Because of service particularities like an intangible and interactive nature (Parasuraman et al., 1985; Gallouj & Weinstein, 1997), the continuous and organic innovation process in services occurs relatively close to the client (Sundbo, 1997; Tether, 2005). This is all the more true for KIBS firms, who often develop new concepts by combining the knowledge and experience they acquire in their role as knowledge brokers (Den Hertog, 2000; Tether & Tajar, 2008).

Acknowledging the limitations of the R&D concept, scholars are adopting the broader notion of innovation capabilities when giving a comprehensive account of a KIBS firms' ability to innovate (Teirlinck & Spithoven, 2013; O'Cass & Sok, 2013; Hogan et al., 2011). Crucial in this respect is the availability of a comprehensive framework of innovation capabilities that allows for comparative analyses across different KIBS firms (Amara et al., 2010). Following the emerging synthesis approach to service innovation (Gallouj, 1994; Coombs & Miles, 2000), such a conceptualization and corresponding operationalization was recently developed (Janssen et al., 2014a).

The framework of dynamic service innovation capabilities (DSICs), adapted from Den Hertog et al. (2010), combines elements of conceptualizations developed for specific service sectors. At the same time, it adopts the modern view on dynamic capabilities in general (Eisenhardt & Martin, 2000; Teece, 2007), stating that one should look at the micro-foundations of common capabilities rather than identifying idiosyncratic capabilities. In line with the leading work by Teece (2007), the operationalized set of DSICs therefore consists of capabilities that can be associated with the evolutionary properties of knowledge transformation as captured by the innovation value chain (Roper et al., 2008). In the development of a measurement scale, Janssen et al. (2014a) argue that a firm's ability to 'conceptualize' depends partially on the extent it is able to 'sense user needs' and 'sense (technological) options' in the first place. Similarly, they find that the capabilities required for actual exploitation of a new proposition ('co-producing and orchestrating' and 'scaling and stretching') depend on the presence of the conceptualization capability in turn (see Figure 1). Together, these capabilities thus cover the various stages that characterize the iterative processes of knowledge production and application.

FIGURE 1

## ***2.2 Routine-like and deliberate openness in KIBS***

The central question in this paper is whether firms in the forefront of openness should develop all five types of capabilities themselves when pursuing innovation, or whether they can be innovative as well by accessing the knowledge and capabilities of others.

By their very nature, KIBS are deeply involved in knowledge exchange (Den Hertog, 2000; Miles, 2005). Their core activity is to transfer information, design, experience or professional knowledge to client firms and assist in applying it (Leiponen, 2005). The type of knowledge that is being provided can range from science and technology (engineering services, computer services) to law, accountancy and management consultancy (Miles, 1995). Within the context of the knowledge economy, KIBS are considered as the bees that cross-pollinate knowledge throughout the innovation system (Den Hertog, 2000; Hipp & Grupp, 2005). Accordingly, innovation literature started with studying how KIBS contribute to innovation of others, before focusing on the innovation created and used by KIBS themselves (Drejer, 2004). Compared to the wider field of services, where innovation is commonly regarded as being fuzzy (Toivonen & Tuominen, 2009), innovation by KIBS is even harder to grasp (Tether, 2005). Since the main objective of KIBS is to solve their clients' problems, new service concepts often evolve out of solutions that once had an 'ad-hoc' nature (Drejer, 2004; Toivonen & Tuominen, 2009; Leiponen, 2005).

Increasingly, service innovation is regarded as emerging from innovation networks that are broader than customers (Bryson et al., 2012). Discussions on multi-agent frameworks (Gallouj & Weinstein, 1997; Windrum & Garcia-Goñi, 2008) have been revitalized with the rising interest in openness (Rubalcaba et al., 2012). Today, both service production and service innovation are regarded as inherently distributed phenomena, carried by a wide range of actors (Tether & Tajar, 2008).

Arguably, it is exactly because intensive interaction lies at the heart of their daily activities that it remains unclear to what extent innovating KIBS can truly rely on external parties. Whereas

open strategies can be clearly distinguished from closed R&D in the manufacturing of new goods (Chesbrough, 2006), this difference is far less obvious in the domain of (knowledge intensive) services (Chesbrough, 2011). Besides drawing on interactions that are part of the routines on which the core activities of KIBS rely, KIBS are also found to develop partnerships explicitly aimed at innovation (Leiponen, 2012). Whether increasing the level of openness is fruitful in firms that are inherently open has hardly been assessed so far (Mina et al., 2013). As a result, there is only a poor understanding of how the various levels of openness in KIBS affect (the importance of) its innovation activities and performance. At the same time, given the trend that firms from virtually every sector are increasingly part of multi-actor producing systems or ‘open landscape’ (Chesbrough, 2006), this research gap pertains to a topic that pre-eminently might enrich the broader innovation literature (Mina et al., 2013).

#### *Knowledge sourcing for exploration*

In recent years, a wide range of innovation studies has examined the benefits of (pre-dominantly) inbound flows of knowledge (Gassmann, et al., 2010). Chesbrough (2006) stresses that external openness can increase the quality and quantity of ideas entering the innovation funnel on which the innovation value chain is based.

Within the more specialized literature on service innovation and service management, especially the role of customers and co-creation has been receiving extensive attention (Bryson et al., 2012). Almost unanimously, scholars find that involving customers contributes to service innovativeness (e.g. Leiponen, 2005; Tether, 2005). Close interaction with customer offers valuable opportunities to learn about both their explicitly expressed and latent needs (Den Hertog et al., 2010). Edvardsson et al. (2001), for instance, stress that inviting customers in service innovation processes leads to a better understanding of their preferences. When studying external links in UK business services, Love et al. (2011) confirm that customers are of significant importance in primarily the exploratory stage of innovation processes.

Also the involvement of suppliers is generally found to be supportive to gathering ideas for new service propositions. This is shown, for instance, in a study on KIBS by Leiponen (2005), in which knowledge sourcing from competitors is positively related to innovation as well. Although universities turned out not to be an important source for service innovation, this is contradicted by studies on the knowledge-bridging role of KIBS as the center of innovation systems (e.g. Amara et al., 2009; Muller & Zenker, 2001). Access to scientific and technical knowledge is an important complement to keeping up to date with the needs from actual or potential customers (Den Hertog et al., 2010; Mina et al., 2013).

Assuming that a larger variety of knowledge sources corresponds to more diversity in the ideas a firm can yield, breadth of knowledge search is often related to innovativeness (Laursen & Salter, 2006). Indeed, by using CIS-data on information flows used by KIBS, Leiponen (2005; 2012) shows that breadth of knowledge sourcing is an important determinant of service innovation as well.

In sum, KIBS firms can strengthen their explorative activities significantly by benefiting from the ideas and knowledge of external parties. When looking at the of DSICs by Den Hertog et al. (2010) en Janssen et al. (2014a), this begs the question to what extent the capabilities to sense user needs and (technological) options should be developed internally. Possibly, it is more attractive to substitute innovation routines like client-profiling and trend analysis for an increased and better use of external linkages.

#### *Co-production and collaboration for exploitation*

On the other end of the innovation value chain, or funnel, we find activities aimed at the actual implementation and commercialization of a new proposition. Manufacturing-based studies on

openness in the innovation process tend to associate exploitative practices mainly with outbound knowledge flows, such as licensing and selling IP (Dahlander & Gann, 2010). Since the disembodied nature of service innovation hardly allows for such practices, they are less likely to be encountered in KIBS. Consistently, Love et al. (2011) find a reduction in the extent of external linkages KIBS use in later stages of the innovation value chain.

Despite modest possibilities to engage in exploitation by commercializing outward flows of knowledge, several recent studies suggest that openness can contribute to the actual creation of business value in service firms. Whereas the relevance of sourcing new ideas decreases when proceeding in the innovation value chain, the importance of detailing a new proposition increases. In the knowledge application phase, external linkages with notably customers and suppliers are found to be useful for KIBS. This is emphasized by Den Hertog et al. (2010), who build on several earlier studies when equipping their capability framework with ‘coproducing and orchestrating’. Kindström et al. (2009), for instance, argue that the ‘value network’ of services is based on service systems in which providers, service partners and customers jointly fulfill the tasks required for delivery of a service experience or solution. Interacting closely with clients, in this stage, might yield feedback on how to improve the newly developed service formula (Lehrer et al., 2012). This latter study shows that designers can increase the quality of their services by relying on client collaboration (e.g. for testing solutions), just like many studies on co-creation have done (Carlborg et al., 2013; Rubalcaba et al., 2012). Scholars also point at the value of involving different types of parties (e.g. other service providers) for optimizing and continuously redesigning new service concepts (Den Hertog et al., 2010).

Since intangibility makes services an experience-good, relying on tacit rather than codified knowledge, possibilities to stretch new concepts to other markets are limited. Also in this aspect of exploitation, however, customers can deliver a valuable contribution to (or even replace) internal capabilities. Similarly, interaction with parties like professional associations might relieve the necessity to possess own skills for rolling out and marketing a new service model (Love et al., 2011).

From the findings described above, we can conclude that deployment of (new) services often occurs in collaboration with external parties who possess skills and knowledge essential for both service production and improvement. Good examples of outward-openness remain scarce, but their existence represents possibilities for reducing the costs of own innovation capabilities on this account.

#### *Translating raw ideas into detailed propositions*

Adhering to the ideas of ambidexterity and absorptive capacity (March, 1991; Cohen & Levinthal, 1990), scholars tend to state that firms are fully open when using external linkages and boundary-spanning knowledge flows for both exploration and exploitation (Vandevrande et al., 2010). Doing so, however, neglects the importance of the intermediate stage of converting raw ideas into actual propositions (Hansen & Birkenshaw, 2007; Love et al., 2011). Research on openness has only briefly addressed the question how firms can integrate acquired external sources into their own operations and innovations (West & Bogers, 2013).

Den Hertog et al. note that the conceptual nature of services implies that this translation stage is peculiar: a service innovation cannot be researched, developed, prototyped and tested in a similar way as physical goods (2010, p. 500). Due to intangibility of the service product, possibilities to communicate codified knowledge are limited. Instead, it involves a high amount of tacit knowledge to assemble new ideas into an innovative knowledge combination. Apart from integrating new ideas (both needs and options) and past experiences, KIBS also face the challenge of aligning a novel service proposition with their current business activities. This element of service conceptualization requires a comprehensive understanding of what the new offering entails as well.

The description of the dynamic service innovation capability of conceptualizing provides relatively few suggestions for how to involve external parties (Den Hertog et al., 2010). In fact, the benefits of openness are mainly discussed as an intra-organizational issue: knowledge transformation ‘is mostly in the hands of a multidisciplinary project team’ (Den Hertog et al., 2010, p. 501). Indeed, Love et al. (2011) show that internal openness in the form of team working is important when encoding ideas into viable service offerings. Moreover, relying on three case-studies on customer-interaction by design services, Lehrer et al. (2012) find that the stage of knowledge transformation is performed best in isolation. They claim that separation between service firms and clients at this stage of service innovation can sometimes be beneficial for KIBS, especially when the innovation involves a high degree of creativity.

### **3. Illustration of openness along a KIBS’ innovation value chain**

Existing literature research on innovation by KIBS suggests that the role of partners varies along the innovation value chain. The evidence we retrieved in section 2 stems from a variety of studies, each of them typically focusing on solely one phase of the sequential steps through which knowledge is converted into marketable solutions. Relatively, empirical evidence for patterns of partner involvement in a service firms’ entire chain of innovation activities is found to be rare. Before engaging in quantitative analyses, we therefore complement the findings from our literature review by reporting the open innovation practices of a single KIBS-firm. The main purpose of this section is to demonstrate in more detail what open innovation can look like in the context of firms that are already open by their very nature. Evidence of such a qualitative nature can provide a valuable contribution to our understanding of open service innovation (Mina et al., 2014).

Our in-depth case study, based on 10 interviews of one hour and additional desk research, concerns the innovation processes in a Dutch consultancy firm specialized in advising health-care institutions. In particular, ‘HealthKIBS’ offers services to create better safety and hospitality in (notably eye-care) hospital departments.<sup>1</sup> For example, it provides training aimed at breaking hierarchical barriers for communication and collaboration within medical teams. Other innovative propositions are the adaptation of a ‘time-out’ in which a one-minute check is performed before starting an operation, and a valet parking service that allows patients to feel welcome and comfortable without stressing about finding parking place.

Many of the offered solutions are unprecedented in the domain in which our focal firm is active. As will become clear, the services it offers are largely based on transferring solutions from other industries to the health sector. These solutions, which are practices to improve an organizations’ function rather than medical solutions, have mainly been developed by the management of a hospital from which our case-firm is a spin-off. Because the hospital’s management could not commercialize her innovations herself, she decided to establish the independent organization we focus on here. The services of HealthKIBS are offered via a franchise model in which various innovative procedures are bundled into a single package. After performing an initial screening, HealthKIBS develops a multi-annual plan in which she selects standardized practices that fit with the specific needs of the client (i.e. franchise-taker). During the execution of this plan, it remains closely involved for monitoring progress and providing additional guidance. Also beyond the domain of health, KIBS in the Netherlands have rarely a franchise-formula like the one described here.

The continuous development of HealthKIBS’s innovative propositions depends on the input of a wide range of external parties. Helping hospitals with optimizing the functioning of her organization provides rich feedback. In that way, HealthKIBS is able to learn about needs that she

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<sup>1</sup> For reasons of discreetness, the name of the focal firm is anonymized here.



would not have identified herself. Apart from looking internally (i.e. at her parent company), it draws on extensive interaction with clients when extending her service portfolio. Rather than developing a pro-active sensing capability, it only ensures that signals from clients are captured and administered.

A more original type of external linkages that led to new ideas is interaction with the airport Schiphol and the airline company KLM. The fields of health and airlines are similar in their search for safety and hospitality. In lack of any competitive threat, the parties were willing to exchange ideas and best practices. Indeed, the time-out and team-training that are unprecedented in the health sector were directly adopted from Schiphol and KLM. Also the implementation of lining on the operation room's floor, in order to ensure that equipment is stored in the appropriate places, is imitated from the lining on the airport. Instead of through a permanent intelligence function, HealthKIBS obtained the required knowledge by organizing only a couple of site visits.

As noted, openness in commercialization has been studied less than openness in the phase of idea generation (West & Bogers, 2013). Existing research, typically performed in a manufacturing context, suggest that commercialization requires secrecy rather than openness (Laursen & Salter, 2013). Meeting the demand for examples in a service setting, our case-study demonstrates how KIBS can rely on other parties when implementing and fine-tuning new services.

The services offered by HealthKIBS include assistance in implementing new practices for becoming safer. How to achieve this depends on the situation of each individual client. Due to the multitude of eye care specialists in the parent firm, it has not always been easy to implement a new practice there straight away. Instead, HealthKIBS 'experimented' with a new practice by deploying it first at a smaller client that might have been embracing the new solution more easily. Applying a new procedure at a client's site provides evidence of the functionality (which increases the chance for successful adoption in the parent firm), but was also found to improve the practice. Contrary to a product that is commercialized by laying it on a shelf, the guidance and consults provided by HealthKIBS require the experience of applying it under different circumstances.

Again, also other parties have been influential in shaping the service portfolio of our case-firm. New practices that could be incorporated in the franchise bundle were not just created by observing the airline industry. Instead, a service like mystery-guest visiting in order to have a pre-treatment impression of a client's safety and hospitality is being delivered in close collaboration with professionals (pursers) from KLM. The same holds for the afore-mentioned team training for medical teams, which is delivered by a partnering agency specialized in training pilots. By relying on these external parties, the focal firm herself does not need to have competences and knowledge that are required for delivering her services. Moreover, by adding services from partners to her own portfolio HealthKIBS increases her visibility as a one-stop-shop for innovative practices in the health sector.

A major reason for HealthKIBS not to avoid outward knowledge flows (in terms of secrecy) is the societal legitimation of her activities. Since the health sector is highly dependent on the politics of public policy, firms in this domain cannot be certain of their future. In order to emphasize its contributions in the domain of health care, HealthKIBS and her parent firm appreciate public attention for their qualities. This means that even without obtaining financial rewards, there is a willingness to diffuse some of the successful practices. For instance, the organization occasionally advises other sectors (banking, firefighting) on how to improve safety and hospitality. These forms of revealing are important for HealthKIBS' innovations. Deploying practices under other circumstances provides yet more opportunities to learn and to optimize. Secondly, building a wider reputation as a safety and hospitality expert augments the possibility that clients from both the health care sector and beyond are willing to enjoy services on a paid basis. The resulting revenues, in turn, are mainly invested in experiments with new practices.

Like in the case of HealthKIBS' explorative efforts, most exploitative activities rely on knowledge flows from daily business (and some incidental events) rather than on strong internal capabilities.

Finally, encoding appears to be an activity which is performed by HealthKIBS and her parent firm internally rather than in collaborative settings. Almost all innovations in this case originated from the two directors at the parent firm that established HealthKIBS. Together with a small staff, including for instance a quality manager, these managers have been making up the majority of improvements that led to such an innovative reputation. Since interaction with external parties causes abundant knowledge flows for idea generation and application, the core of the innovation activities lies in combining signals into new propositions. Interviewed stakeholders almost unanimously regard the creativity and visionary leadership of the managers involved as one of the key factors in innovation. Not only do the managers and their support combine ideas into a practice that can be deployed; they are also able to give the new concept a name and specify in detail what it is, what value it has, and how it can be delivered. This essential part of encoding makes that resulting innovations receive ample publicity, as opposed to improvements that are simply applied without becoming an innovation that can be deployed elsewhere.

### 3. Hypothesis development

Synthesizing the observations from the previous sections, we obtain a pattern which is similar to the one Lehrer et al. (2012) found when studying design firms. The variety of practices for engaging in both open knowledge generation and open knowledge application is rich, but opportunities for involving partners in conceptualizing are limited. For the case-study we conducted, this can be visualized as shown in Figure 2.

FIGURE 2

To what extent the encountered possibilities for relying on partners influence the need for internal innovation capabilities has not been assessed so far. According to the resource-based view, access to the knowledge and capabilities of others reduces the need to develop in-house strengths (Barney, 1991; Roper et al., 2008). In Figure 3, below, we complement our findings on partner-relevance with implications regarding the choice where to allocate capabilities. The vertical axis of the depicted box represents the balance between developing internal capabilities (upper part) versus relying on external capabilities and knowledge (lower part). As argued throughout this paper, the balance can vary per stage of the innovation value chain (shown on the horizontal axis). Ultimately, firms aim to ensure that activities for all parts of the innovation value chain are performed, which corresponds with less 'white space' in our visual representation.<sup>2</sup>

Research on knowledge sourcing by KIBS finds external linkages (be it routine-based interaction or deliberate collaboration) to be important for acquiring and generating ideas. Although the role of partners decreases as activities in the innovation value chain get less explorative, studies on commercialization and management of new services have demonstrated that partner importance reappears when the innovation funnel reaches the stage of actually deploying new formulas. In Figure 3, this is shown by the fact that there is only little room for KIBS to increase the strength of their

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<sup>2</sup> The figure assumes that there is an optimal level of innovation activities to be performed by either the firm itself or its partners. Our view on this point is that firms usually benefit from every additional innovation activity, but that extra efforts might have marginally decreasing returns. Thus, the conceptual illustration represents the quest to find an optimum between the effects as well as costs of developing internal capabilities, versus the effects and costs of relying on external partners. Finding an optimal solution in our simplified representation corresponds with elimination of 'white space' (unperformed activities with marginally positive returns) by developing sufficiently strong capabilities without creating overlap with the activities of external parties.

innovation capabilities on the respective accounts of knowledge generation and application (hence the little arrows). Whenever KIBS invest heavily in innovation activities that might also be performed by relying on the input of external users, costly overlap might arise (Laursen & Salter, 2006; Roper et al., 2008). This is less likely to occur for activities related to transforming raw ideas in strong propositions; in the intermediate stage of the innovation value chain, the possible role of external parties is not self-evident. Recent case-studies, including our own, suggest that knowledge transformation occurs best in isolation. If true, this implies that innovation-pursuing KIBS can complement an open strategy better with a strong conceptualizing capability rather than developing the substitutable capabilities for exploration and exploitation. Therefore, we arrive at the following hypothesis:

Hypothesis: *“For innovation-pursuing KIBS, the conceptualizing capability will have the strongest interaction effect with openness”*

FIGURE 3

#### **4. Method for statistical analysis**

##### **4.1 Dataset**

The statistical analysis we present is based on a dataset that was constructed by sending out a questionnaire to a wide variety of Dutch firms. As described in previous studies using the resulting dataset (Janssen et al. 2014a, 2014b), the respondents consist of CEO's and top managers from firms (10+ employees) in the greater Amsterdam and Utrecht area. Previous studies have classified firms as KIBS when belonging to computer and related activities, research and development, or other business activities (Castaldi, 2009; Leiponen, 2012). In NACE Rev.2, this corresponds with information and communication services (sector J) and professional, scientific and technical activities (sector M). The table below shows how our sample of 147 cases is distributed over the respective subsectors of these KIBS categories.

TABLE 1

##### **4.2 Statistical method**

We examine the influence of DSICs and openness on innovation by testing linear regression models in the statistical software package SPSS 20. Our approach follows the figure below.

First, we explore the relative influence of the five dynamic service innovation capabilities on renewal of the service portfolio (Model 1). This exercise serves to give an empirical account of the respective importance of each of the capabilities for creating service innovation. So far, this essential step has not been made yet in the literature (Den Hertog et al., 2010; Janssen et al., 2014a).

Secondly, we extend the model with the direct influence of maintaining external linkages for innovation purposes (Model 2). Using information about deliberate partnerships with clients or other parties, we also create interaction terms with DSICs in order to verify our hypothesis (Model 3). In order to avoid multi-collinearity, variables used for interaction terms are all mean-centered (Aiken and West, 1991).

FIGURE 4

##### **4.3 Description of variables in the models**

The dataset we rely on contains responses to survey-questions adopted from the Community Innovation Survey (2010), as well as several items for new measurement scales. For the current study, particularly the items related to dynamic service innovation capabilities (DSICs) and service

innovation are of relevance. Since both of them have been presented in previous studies, we stick to a brief description. All of the report scales are based on a 7-point Likert-scale, ranging from “strongly disagree” to “strongly agree”. Descriptive characteristics and correlations of the subsequently discussed variables are shown in table 2.

*Dynamic service innovation capabilities* form one half of the independent variables we are interested in (X1). As mentioned throughout this paper, they consist of sensing user needs, sensing (technological) options, conceptualizing, co-producing & orchestrating, and scaling & stretching (Den Hertog et al., 2010; Janssen et al., 2014a). The measurement items for this new scale are based on underlying micro-foundations (Teece, 2007), identified in extensive literature and empirical research (Den Hertog et al., 2010). For more details on scale development, see Janssen et al. (2014a).

*Openness* is the other focal point of this study (X2). To be consistent with the established body of research, we adapted a standard scale from the Community Innovation Survey (based on the Oslo Manual). Firms were asked to state to what extent they have been engaging in deliberate partnerships with an innovation objective. One minor modification we made is the inclusion of a question regarding the importance of freelancers, since they account for an important part of employment within the Dutch economy. The variable used in our analysis is the sum of scores given for all external parties. Note that this indicator concerns deliberately formed partnerships with the aim of innovation; they form an addition to the interaction a firm is naturally engaging in when delivering its products or services.

*Service innovation* is the dependent variable (Y). It was constructed by equipping the survey with questions regarding renewal of the business activities in the preceding three years.<sup>3</sup> Since this concept is hard to grasp with traditional distinctions like process and product innovation, we adopted recent insights on the multidimensional nature of service innovation (Den Hertog, 2000; Carlborg et al., 2013; Janssen et al. 2014b). Although this perspective is increasingly being accepted, no measurement scale was found to be readily available. The steps undertaken to operationalize the multidimensional framework by Den Hertog et al. (2010), including the items, are described in Janssen et al. (2014b). For the current analysis, we constructed an aggregated measure by summing the scores on each of the six dimensions (Mina et al., 2014). Thereby, the resulting variable can also be regarded as a service-specific indicator for ‘innovation diversity’ (Love et al., 2011).

*Control variables*, as present in our analyses, include in the first place the logarithm of firm size. In line with similar studies, we also use a proxy for the extent a firm is oriented towards engaging in innovation (e.g. Leiponen, 2012). Since R&D budgets are an inappropriate measure in the context of KIBS, we asked them whether they had formalized procedures for innovation in place. Items are shown in Appendix B. Finally, our last two control variables concern the environment a firm is operating in. This aspect, which might affect our findings, is captured by the environmental turbulence (Laursen & Salter, 2006), and the degree of competitive intensity (Keupp & Gassmann, 2009). Competitive pressure ( $\alpha = ,775$ ) and market dynamism ( $\alpha = ,829$ ) were measured with scales developed by Jansen et al. (2006).

TABLE 2

## 5. Results from regression models

Before exploring the role of openness, we examine to what extent the five DSICs can be related to the creation of innovative services. Inspection of the descriptive statistics in Table 2 reveals that all of the individual capabilities are significantly correlated with the amount of changes a KIBS

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<sup>3</sup> Asking respondents to look back is a common method for analysing the lagged effect of capabilities on innovativeness (e.g. Mansury & Love, 2008)

has been introducing in its service portfolio (i.e. service innovation). To study their relative influence, we simultaneously test the statistical correlations of all the capabilities in one single regression model. Although common method bias might be an issue if we were to prove the importance of dynamic service innovation capabilities, it is less problematic in analyses focused on their respective role.

Model 1 in Table 3 shows that for KIBS, dynamic service innovation capabilities have more predictive power for achieving innovative output than the control variables we retrieved from the same survey. Especially having the capability of sensing (technological) options appears to be strongly related to creating service innovation. An exception is the capability of ‘sensing user needs’; in comparison to having the other DSICs, this capability appears not to be discriminative for innovativeness.

Turning towards the core of our analysis, we look at the role of engaging in interaction with external parties. According to the results of Model 2, maintaining deliberate partnerships (in addition to routine-based forms of interaction) does not contribute substantially to achieving innovative output. Relatively, having capabilities appears to be more important for innovation. The main question, however, concerns the interaction between the two: do a KIBS’ internal capabilities still matter when engaging in high degrees of openness? This is what Model 3 can tell us.

When including the interaction effects between openness and the dynamic capabilities, we find that almost none of them is statistically significant. The only exception is conceptualizing. Whereas capabilities for the explorative and exploitive aspects of the innovation value chain are no longer of discriminative value when a firm is highly open, the interaction term for openness turns out to be of positive significance. Although the observed effect is only weak, it clearly is stronger than the negative and non-significant effects of the other interaction terms. This finding confirms the hypothesis that a high degree of openness might reduce the importance of internal exploration and exploitation capabilities more than it can affect the predictive power of conceptualizing. With respect to the trade-off between internal and external competences, the translation of raw ideas into concrete propositions appears to be relatively difficult to leave to external parties. Even for KIBS who increase their level of openness by engaging in deliberate partnerships, there is value to maintain an internal capability for conceptualizing.

TABLE 3

## 6. Discussion

By building on research concerning openness, the innovation value chain and dynamic capabilities, we examined when external linkages can substitute internal innovation capabilities. To understand better the various ways external parties can be involved in open service innovation, a poorly studied research topic (Mina et al., 2014), we first performed an in-depth case-study. Being aimed at illustrating patterns of openness along a KIBS’ innovation value chain, this exercise pointed at original forms of open innovation in services. In particular, the case-study demonstrated examples of practices that can be used for benefitting from both in- and outbound knowledge flows (thereby forming an alternative to internal innovation capabilities). This latter aspect has rarely been studied in services, and shows that commercialization does not necessarily require secrecy (e.g. Laursen & Salter, 2013). Importantly, our case findings are also in line with the pattern we synthesized from reviewing literature on the role of external partners in service innovation. A quantitative analysis forms the second part of this paper.

Due to missing metrics, the relation between having dynamic capabilities and realizing service innovations had hardly been assessed so far (Den Hertog et al., 2010). According to our statistical findings, sensing user needs is the only capability not significantly related to a KIBS’

innovation output. This counter-intuitive finding emphasizes the need to focus on complementarity when developing in-house capabilities. Our results do not object to common findings that customers have a major impact on (service) innovation (e.g. Love et al., 2011); they only suggest that for KIBS this is not the most promising area to target when developing innovation capabilities. Because professional service providers typically engage in ‘on-the-job’-learning by engaging in close interaction with their clients (Leiponen, 2005), there appears to be relatively limited value in developing an intelligence function on this account. As Leiponen noted (2012, p. 1258), building an internal sensing function “cannot replace direct contact between clients and employees active in new service development”. On the other hand, sensing (technological) needs turns out to be all the more important for realizing service innovations. The discriminatory property of this capability is in line with the common finding that many service innovations are based on especially ICT-technology. Future research could serve to clarify under which circumstances also sensing user needs and customer behavior also allows this latter group to become more innovative than their competitors. In a service-oriented study, Salunke et al. (2013, p. 1093) state that “the use of dynamic capabilities in gaining and exploiting customer-based knowledge and its effect on sustaining innovation-based advantage remains a neglected area”.

Analyses on service innovation in KIBS show that four out of five capabilities are not significant in interaction with openness. Apparently, when KIBS raise their level of openness by maintaining innovation-oriented partnerships (rather than just engaging in operational interactions), only the conceptualizing capability is still of discriminative value for achieving innovative output. The results of our analyses thereby provide strong evidence for the expectation that KIBS who maintain extensive external relationships might benefit mainly from having an internal ability to translate acquired and generated ideas into marketable propositions. The other capabilities are relatively less attractive to develop internally, as also external parties can take care of some of the activities at the beginning and end of the innovation value chain.

## **7. Conclusion**

The main contribution of our study lies in the demonstration of a qualitative limitation to substituting capabilities for openness. Whereas research on openness has focused primarily on identifying optimal levels of openness (e.g. Laursen & Salter, 2006, 2013; Berchicci, 2013), we presented evidence for the argument that there is a functional restriction in the extent to which firms can rely on the skills and knowledge of others.

With respect to the discussion on innovation capabilities in KIBS, we provide explanation for the observation that they can be innovative without having strongly developed internal innovation activities. Not only is there an ‘innovation gap’ (Gallouj & Djellal, 2010) because we do not observe some innovation activities due to the narrow definition of R&D (which we address by demonstrating the relevance of dynamic service innovation capabilities); our study suggests that internal innovation activity is also less of a need for KIBS. Since business providers interact with their clients, suppliers and other external parties on a relatively intensive basis, they face ample opportunities to rely on knowledge and capabilities outside the boundaries of their own firm. Although external parties can take over some of the innovation activities, the importance of being able to translate knowledge into concrete propositions might still be of major importance. On the basis of the current study we can state that highly open firms possibly can rely on fewer internal dynamic capabilities (in terms of diversity), but the capability they do rely on is likely to be still very crucial for being innovative.

Looking beyond the domain of services, finally, our findings have important implications for any firm that takes part in adopting an open strategy (Chesbrough, 2011) and switching to service inclusive business models (Mina et al., 2014). When external parties can accommodate activities in the phases of idea generation as well as knowledge application, managers might consider focusing

their efforts at the development of a strong conceptualizing capability. Whereas the notion of absorptive capacity is typically associated with the entire range of innovation capabilities (e.g. Boly et al., 2013), or even mainly the explorative and exploitative aspects (Vandevrande et al., 2010), our results suggest that especially the intermediate capability of conceptualizing allows open firms to benefit from knowledge flows. According to Den Hertog et al. (2010), firms can develop their conceptualizing capability by engaging in practices like prototyping, visualizing, (service) blueprinting, nurturing corporate entrepreneurship and out-of-the-box thinking. In order to support innovation managers more adequately, future research might investigate deeper what other ways there are to build and benefit from a conceptualizing capability.

## References

- Aiken, L., & West, S. (1991). *Multiple regression: testing and interpreting interactions*. Newbury Park, CA: Sage Publications.
- Amara, N., Landry, R., & Doloreux, D. (2009). Patterns of innovation in knowledge-intensive business services. *The Service Industries Journal*, 29(4), 407-430.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 99-120.
- Barras, R. (1990). Interactive innovation in financial and business services: The vanguard of the service revolution. *Research Policy*, 19, 215-237.
- Berchicci, L. (2013). Towards an open R&D system: Internal R&D investment, external knowledge acquisition and innovative performance. *Research Policy*, 42, 117-127.
- Bharadwaj, N., & Dong, Y. (2013). Toward further understanding the market-sensing capability-value creation relationship. *Journal of Product Innovation Management*, 31(4). doi:10.1111/jpim.12124
- Boly, V., Morel, L., Guillaume Assielou, N., & Camargo, M. (2013). Evaluating innovative processes in french firms: Methodological proposition for firm innovation capacity evaluation. *Research Policy*.
- Bryson, J., Rubalcaba, L., & Strom, P. (2012). Services, innovation, employment and organisation: research gaps and challenges for the next decade. *The Service Industries Journal*, 641-655.
- Caloghirou, Y., Kastelli, I., & Tsakanikas, A. (2004). Internal capabilities and external knowledge sources: complements or substitutes for innovative performance? *Technovation*, 24(1), 29-39.
- Cassiman, B., & Veugelers, R. (2006). In search of complementarity in innovation strategy: internal R&D and external knowledge acquisition. *Management Science*, 52(1), 68-82.
- Castaldi, C. (2009). The relative weight of manufacturing and services in Europe: An innovation perspective. *Technological Forecasting & Social Change*, 76, 709-722.
- Chesbrough, H. (2006). *Open business models: How to thrive in the new innovation landscape*. Boston, MA: Harvard Business School Press.
- Chesbrough, H. (2011). *Open services innovation: Rethinking your business to grow and compete in a new era*. New York, NY: John Wiley & Sons.
- Christensen, J., Olesen, M., & Kjaer, J. (2005). The industrial dynamics of open innovation: evidence from the transformation of consumer electronics. *Research Policy*, 34(10), 1533-1549.
- Cohen, W., & Levinthal, D. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152.
- Coombs, R., & Miles, I. (2000). Innovation, measurement and services: the new problematique. In J. Metcalfe, & I. Miles, *Innovation systems in the service economy. Measurements and case study analysis* (pp. 83-102). Dordrecht: Kluwer Academic Publishers.
- Crossan, M., & Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: a systematic review of the literature. *Journal of Management Studies*, 1154-1191.
- Dahlander, L., & Gann, D. (2010). How open is innovation? *Research Policy*, 699-709.
- Den Hertog, P. (2000). Knowledge intensive business services as co-producers of innovation. *International Journal of Innovation Management*, 491-528.
- Den Hertog, P., Van der Aa, W., & De Jong, M. (2010). Capabilities for managing service innovation: towards a conceptual framework. *Journal of Service Management*, 490-514.
- Drejer, I. (2004). Identifying Innovation in Surveys of Services: A Schumpeterian Perspective. *Research Policy*, 551-562.
- Drnevich, P., & Kriauciunas, A. (2011). Clarifying the conditions and limits of the contributions of ordinary and dynamic capabilities to relative firm performance. *Strategic Management Journal*, 254-279.
- Edvardsson, B., Gustafsson, A., Kristensson, P., Magnusson, P., & Matthing, J. (2001). *Involving customers in new service development*. London: Imperial College Press.
- Eisenhardt, K., & Martin, J. (2000). Dynamic capabilities: what are they? *Strategic Management Journal*, 1105-1021.
- Gallouj, F. (1994). *Economie de l'innovation dans les services [The economics of innovation in services]*. Paris: Editions L'Harmattan, Logiques économiques.
- Gallouj, F., & Djellal, F. (2010). *The Handbook of Innovation and Services*. Cheltenham, UK: Edward Elgar.
- Gallouj, F., & Savona, M. (2009). Innovation in services: a review of the debate and a research agenda. *Journal of Evolutionary Economics*, 149-172.
- Gallouj, F., & Weinstein, O. (1997). Innovation in services. *Research Policy*, 26(4-5), 537-556.
- Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R&D Management*, 40, 213-221.
- Hansen, M., & Birkinshaw, J. (2007). The innovation value chain. *Harvard Business Review*(June), 121-130.



- Hipp, C., & Grupp, H. (2005). Innovation in the service sector: The demand for service-specific innovation measurement concepts and typologies. *Research Policy*, 34, 517-535.
- Hogan, S., Soutar, G., McColl-Kennedy, J., & Sweeney, J. (2011). Reconceptualizing professional service firm innovation capability: scale development. *Industrial Marketing Management*, 40, 1264-1273.
- Hsieh, K., & Tidd, J. (2012). Open versus closed new service development: The influences of project novelty. *Technovation*, 32, 600-608.
- Jansen, J., Van den Bosch, F., & Volberda, H. (2006). Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators. *Management Science*, 52, 1661-1674.
- Janssen, M., Castaldi, C., & Alexiev, A. (2014a). Dynamic capabilities for service innovation: conceptualization and measurement. *ESIC Working paper 14.07, Eindhoven University of Technology*. Available [here](#).
- Janssen, M., Castaldi, C., & Alexiev, A. (2014, forthcoming). Exploring a multidimensional approach to service innovation. In R. Agarwal, W. Selen, G. Roos, & R. Green, *The Handbook of Service Innovation*. Springer.
- Keupp, M., & Gassmann, O. (2009). Determinants and archetype users of open innovation. *R&D Management*, 39(4), 331-341.
- Kindström, D., Kowalkowski, C., & Sandberg, E. (2012). Enabling service innovation: A dynamic capabilities approach. *Journal of Business Research*. doi:10.1016/j.jbusres.2012.03.003
- Laursen, K. (2012). Keep searching and you'll find: what do we know about variety creation through firms' search activities for innovation? *Industrial and Corporate Change*, 21(5), 1181-1220.
- Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, 27, 131-150.
- Laursen, K., & Salter, A. (2013). The paradox of openness: Appropriability, external search and collaboration. *Research Policy*.
- Lehrer, M., Ordanini, A., DeFillippi, R., & Miozzo, M. (2012). Challenging the orthodoxy of value co-creation theory: A contingent view of co-production in design-intensive business services. *European Management Journal*, 30, 499-509.
- Leiponen, A. (2005). Organization of knowledge and innovation: The case of Finnish business services. *Industry and Innovation*, 12(2), 185-203.
- Leiponen, A. (2012). The benefits of R&D and breadth in innovation strategies: a comparison of Finnish service and manufacturing firms. *Industrial and Corporate Change*, 21(5), 1255-1281.
- Leiponen, A., & Helfat, C. (2010). Innovation objectives, knowledge sources, and the benefits of breadth. *Strategic Management Journal*, 31, 224-236.
- Love, J., & Roper, S. (2001). Location and network effects on innovation success: evidence for UK, German and Irish manufacturing plants. *Research Policy*, 30, 643-661.
- Love, J., Roper, S., & Bryson, J. (2011). Openness, knowledge, innovation and growth in UK business services. *Research Policy*, 40, 1438-1452.
- Love, J., Roper, S., & Vahter, P. (2013). Learning from openness: The dynamics of breadth in external innovation linkages. *Strategic Management Journal*. doi:10.1002/smj.2170
- Mansury, M., & Love, J. (2008). Innovation, productivity and growth in US business services: A firm-level analysis. *Technovation*, 28, 52-62.
- Miles, I. (2005). Innovation in services. In J. M. Fagerberg, *The Oxford handbook of innovation*. Oxford: Oxford University Press.
- Miles, I. (2007). Research and development (R&D) beyond manufacturing: the strange case of services R&D. *R&D Management*, 37, 249-268.
- Mina, A., Bascavusoglu-Moreau, E., & Hughes, A. (2014). Open service innovation and the firm's search for external knowledge. *Research Policy*.
- Muller, E., & Zenker, A. (2001). Business services as actors of knowledge transformation: the role of KIBS in regional and national innovation systems. *Research Policy*, 30, 1501-1516.
- O'Cass, A., & Sok, P. (2013). Exploring innovation driven value creation in B2B servicefirms: The roles of the manager, employees and customers in value creation. *Journal of Business Research*(66), 1074-1084.
- Parasuraman, A., Zeithaml, V., & Berry, L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49, 41-50.
- Ray, G., Barney, J., & Muhanna, W. (2004). Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal*, 25, 23-37.
- Roper, S., Du, J., & Love, J. (2008). Modelling the innovation value chain. *Research Policy*(37), 961-977.
- Rubalcaba, L., Michel, S., Sundbo, J., Brown, S., & Reynoso, J. (2012). Shaping, organizing, and rethinking service innovation: a multidimensional framework. *Journal of Service Management*, 33, 696-715.

- Salunke, S., Weerawardena, J., & McColl-Kennedy, J. (2011). Towards a model of dynamic capabilities in innovation-based competitive strategy: Insights from project-oriented service firms. *Industrial Marketing Management*, 1261-1263.
- Smith, A., Fischbacher, M., & Wilson, F. (2007). New service development: from panoramas to precision. *European Management Journal*, 370-383.
- Sundbo, J. (1997). Management of innovation in services. *The Service Industries Journal*, 432-455.
- Teece, D. (2007). Explicating dynamic capabilities: the nature and micro-foundations of (sustainable) enterprise performance. *Strategic Management Journal*, 370-383.
- Teece, D., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 509-533.
- Teirlinck, P., & Spithoven, A. (2013). Formal R&D management and strategic decision making in small firms in knowledge-intensive business services. *R&D Management*, 43(1), 37-51.
- Tether, B. (2005). Do services innovate (differently)? Insights from the European Innobarometer Survey. *Industry and Innovation*, 153-184.
- Tether, B., & Tajar, A. (2008). The organisational-cooperation mode of innovation and its prominence amongst European service firms. *Research Policy*, 720-739.
- Toivonen, M., & Tuominen, T. (2009). Emergence of innovation in services. *The Service Industries Journal*, 887-902.
- Van de Vrande, V., Vanhaverbeke, W., & Gassmann, O. (2010). Broadening the scope of open innovation: past research, current state and future directions. *International Journal of Technology Management*, 221-235.
- Von Zedtwitz, M., & Gassmann, O. (2002). Market versus technology R&D internationalisation: Four different patterns of managing research and development. *Research Policy*, 31, 569-588.
- West, J., & Bogers, M. (2013). Leveraging external sources of innovation: a review of research on open innovation. *Journal of Product Innovation Management*, 31(4).
- Windrum, P., & García-Goñi, M. (2008). A neo-Schumpeterian model of health services innovation. *Research Policy*, 649-672.
- Zahra, S., Sapienza, H., & Davidsson, P. (2006). Entrepreneurship and dynamic capabilities: A review, model and research agenda. *Journal of Management Studies*, 917-955.

## Tables

	<b>KIBS sector</b>	<b>147</b>
J: Information and communication		46
<i>Publishing activities</i>		1
<i>Motion picture, video and television programme production, sound recording and music publishing</i>		8
<i>Programming and broadcasting activities</i>		1
<i>Telecommunications</i>		1
<i>Computer programming, consultancy and related activities</i>		32
<i>Information service activities</i>		3
M: Professional, scientific and technical activities		101
<i>Legal and accounting activities</i>		14
<i>Activities of head offices; management consultancy activities</i>		32
<i>Architectural and engineering activities</i>		24
<i>Scientific research and development</i>		4
<i>Advertising and market research</i>		21
<i>Other professional, scientific and technical activities</i>		6

Table 1: Sectoral composition of the dataset

		Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12
1	Firm size (log)	3,54	1,30												
2	Formalized innovation activity	3,38	1,36	,02											
3	Market dynamism	5,06	1,31	,02	,05										
4	Competitive pressure	4,98	1,15	-,06	-,10	,170*									
5	DSIC 1: Sensing user needs	4,71	1,21	,04	,37**	,13	,11								
6	DSIC 2: Sensing (techn.) options	5,23	1,18	,00	,18*	,23**	,19*	,45**							
7	DSIC 3: Conceptualising	4,82	1,13	-,12	,23**	,26**	-,13	,45**	,47**						
8	DSIC 4: Co-producing & orchestrating	4,61	1,28	,01	,17*	,16	,08	,20*	,24**	,25**					
9	DSIC 5: Scaling & stretching	4,34	1,33	,10	,31**	,07	-,08	,30**	,32**	,34**	,01				
10	Openness (partnerships)	2,85	,96	,09	,18*	,22**	,13	,09	,22**	,23**	,41**	,09			
11	Service innovation	4,42	,91	,02	,11	,33**	,08	,22**	,44**	,49**	,34**	,39**	,39**		
12	Innovative performance	14,74	3,54	-,16	,18	,11	-,30	,13	,15	,40**	,05	,37**	,03	,22	

Table 2: Descriptive statistics and correlations. \* =  $p < ,05$ ; \*\* =  $p < ,01$

	<b>Model 1</b>		<b>Model 2</b>		<b>Model 3</b>	
	Beta	Std. error	Beta	Std. error	Beta	Std. error
Firm size (log)	,022	,051	,010	,051	-,014	,052
Formal innovation activity	-,072	,056	-,086	,056	-,067	,058
Market dynamism	,112	,057	,101	,057	,107	,058
Competitive pressure	,055	,063	,042	,063	,052	,065
DSIC 1: Sensing user needs	-,089	,069	-,077	,069	-,088	,225
DSIC 2: Sensing (techn.) options	,299***	,081	,276***	,082	,277**	,259
DSIC 3: Conceptualising	,228**	,080	,223**	,079	,228**	,255
DSIC 4: Co-producing & orchestrating	,174**	,056	,141*	,058	,136	,178
DSIC 5: Scaling & stretching	,187**	,059	,194**	,059	,208**	,211
Openness (partnerships)			,119	,080	,149	,469
DSIC 1 * Openness					-,126	,082
DSIC 2 * Openness					-,036	,098
DSIC 3 * Openness					,185*	,089
DSIC 4 * Openness					-,020	,062
DSIC 5 * Openness					-,117	,071
R2			,381		,391	
Adjusted R2			,332		,338	
R2 change			,381		,011	
Significance of change			,000		,156	

Table 3: Results from regression analyses on service innovation. \* =  $p < ,10$ ; \*\* =  $p < ,05$ ; \*\*\* =  $p < 0,01$

## Figures

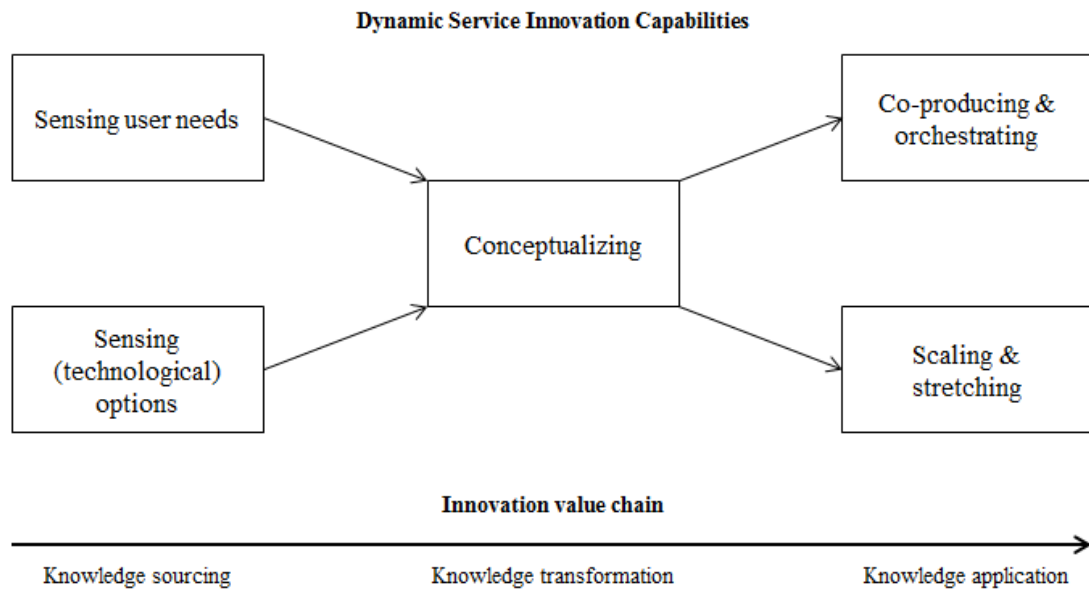


Figure 1: Link between dynamic service innovation capabilities (Den Hertog et al., 2010) and the innovation value chain (Hansen and Birkinshaw, 2007; Roper et al., 2008). Based on Janssen et al. (2014a).

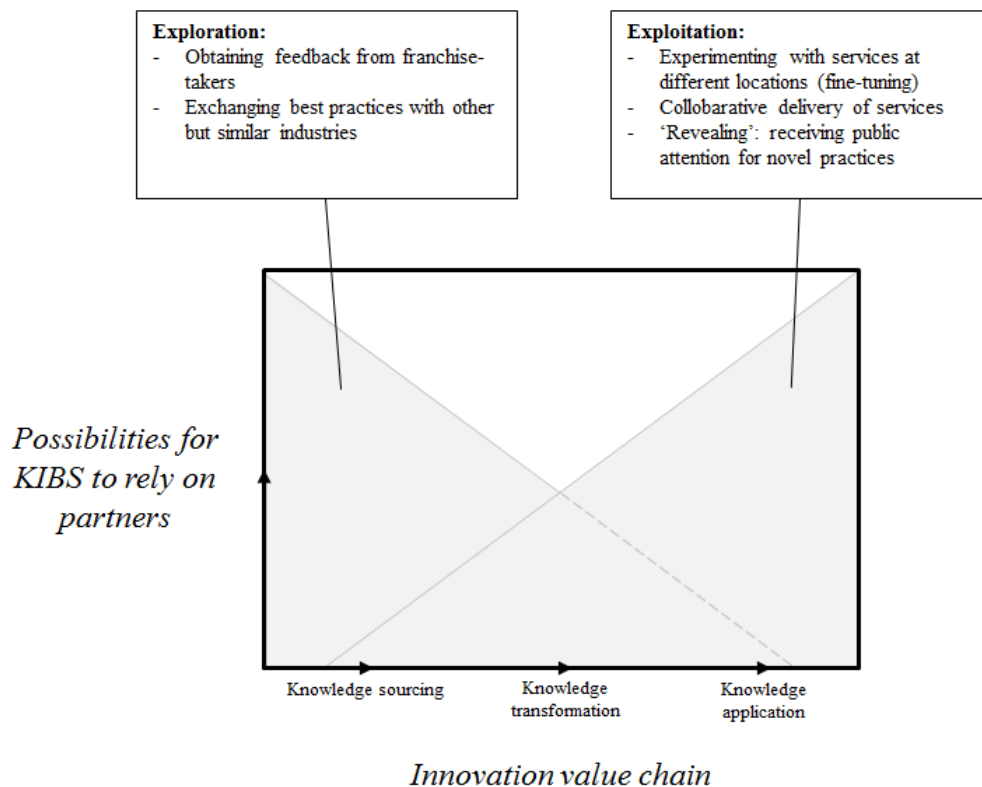


Figure 2: Schematic representation of HealthKIBS's possibilities to rely on knowledge and competences of partners. Based on Lehrer et al. (2012).

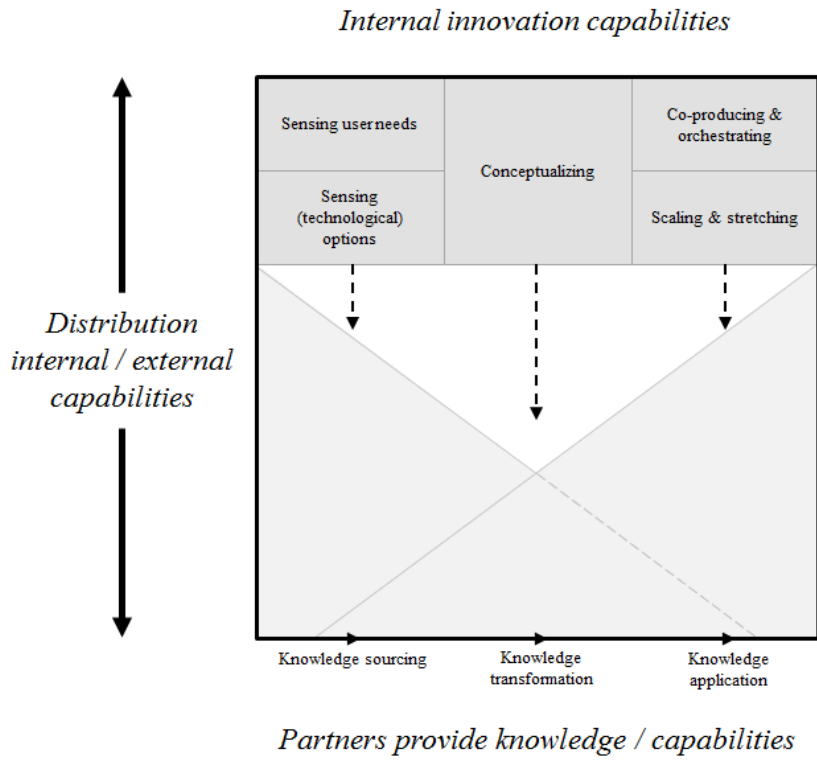


Figure 3: Hypothesized relationships between a KIBS' need for internal innovation capabilities and IVC-stages.

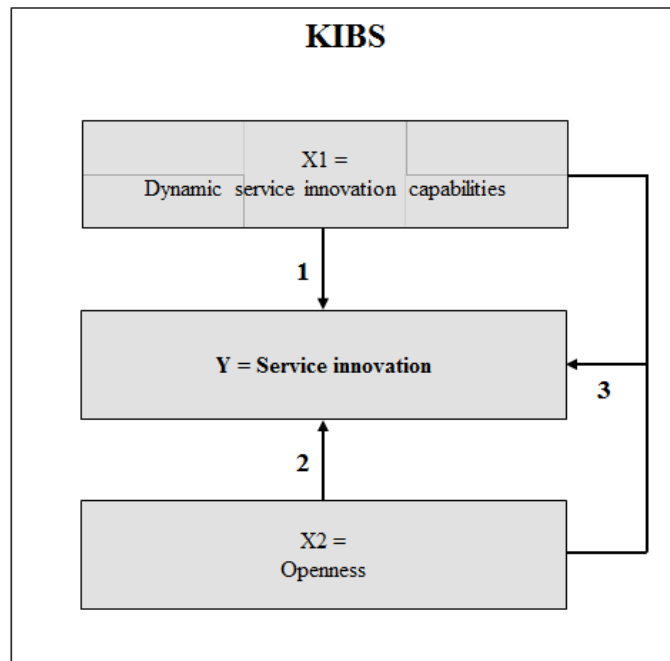


Figure 4: Structure of statistical analyses

## Appendices

### *Appendix A: Measurement items for formalization of service innovation*

- We evaluate the progress of our development of new services systematically
- The development of new services occurs via specific guidelines and procedures
- The final decision to introduce a new service is the result of a formalized process
- New services are being developed according to a schematic plan
- Progress in the development of new services is documented in writing

*Cronbach alpha = 0,907; mean = 3,57; variance = 1,82; standard deviation = 1,35*