Inseminating knowledge: The unintended effects of knowledge-intensive business services on client's innovation-related absorptive capacity

Guillaume Imbert
Laboratoire IREGE, Université de Savoie
guillaume.imbert@univ-savoie.fr

Resume :

Absorptive capacity helps determine innovation performance, yet despite the growing importance of service firms and open innovation in this context, extant literature continues to ignore the influence of suppliers. That is, external service providers may advance the knowledge absorption process of their clients. To address this gap, this study introduces the concept of insemination capacity, or a consulting firm's ability to initiate and perpetuate a knowledge absorption sequence. Although knowledge-intensive business services might not explicitly seek to strengthen a client's absorptive capacity, the provider's insemination capacity may do so anyway. On the basis of prior empirical research, this study suggests that insemination capacity consists of four triggering mechanisms. This proposed framework offers new insights into supplier–client innovation performance.

Key words : absorptive capacity, innovation, insemination capacity, knowledge-intensive business services,

Résumé :

La capacité d'absorption est un déterminant clé de la performance d'innovation, mais malgré l'importance croissante des sociétés de service et de l'innovation ouverte dans ce contexte, la littérature a négligé le rôle des prestataires. Ces derniers peuvent pourtant impacter le processus d'absorption des connaissances de leur client. Cette recherche introduit le concept de capacité d'insémination, soit la capacité d'une société de conseil à déclencher et développer une séquence d'absorption des connaissances chez son client. Bien que le développement de la capacité d'absorption du client ne soit pas l'objectif de la société de conseil, la capacité d'insémination du prestataire peut agir en ce sens. En nous basant sur des études empiriques antérieures, cette recherche suggère que la capacité d'insémination s'appuie sur quatre mécanismes. Elle offre de nouveaux éléments pour comprendre la performance d'innovation des contrats associant un client à son prestataire.

Mots-clés : capacité d'absorption, capacité d'insémination, innovation, knowledge-intensive business services.

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Introduction

Organizations rely on innovation and knowledge management to face major environment transitions, such as market, technological, or institutional changes. For example, open innovation strategies can help them preserve competitive advantages (Chesbrough, 2003), leading to more innovation-related activities conducted outside organizational boundaries. Such interorganizational knowledge transfers extend firms' knowledge bases (Argote et al., 2003). However, most prior research focuses on strategic alliances (Easterby-Smith et al., 2008), partnerships, and multinational corporations, at the expense of "traditional," contractual client–supplier relationship. Far beyond performing basic tasks in response to clients' direct orders though, modern suppliers of services often take charge of strategic assignments. In particular, knowledge-intensive business services (KIBS), including consultants, can determine their clients' innovation performance through their influence on knowledge creation, accumulation, and dissemination (Miles et al., 1995).

Knowledge management activities by service firms also create difficulties related to knowledge transfer and writing effective contracts to ensure knowledge absorption by the client firm. In this context, absorptive capacity (Cohen and Levinthal, 1990) is critical to both the client's and the service provider's collaborative performance. Despite widespread recognition that absorptive capacity (ACAP) is dynamic, most research also continues to offer a static view of its antecedents, without considering the role of knowledge sources or the growing trend of open innovation.

With this research, we seek an unconventional point of view, namely, that of the suppliers. To stress the need for an extended, dynamic view of ACAP, we present a theoretical contribution here, rooted in empirical research conducted during the past two decades in the fields of KIBS, consulting, innovation management, knowledge transfers, and absorptive capacity. Specifically, we explore the role of consulting firms in the knowledge absorption sequence and the development of their clients' absorptive capacity, in the context of innovation

contracts. We thus complement absorptive capacity literature by examining the effect of KIBS providers on clients' absorptive capacity.

From this examination, we derive the notion of insemination capacity, which we define as the dynamic capacity developed by consulting firms to initiate and advance a knowledge absorption sequence by a client organization. Thus, the concept does not necessarily require the direct development of the ACAP of the client. Instead, we suggest that consulting firms might not aim to strengthen their client's ACAP but rather that this development might result from their insemination capacity, in several specific conditions.

Therefore, we begin by introducing our research setting, namely, the consultant–client relationship in an innovation context. After we outline the ACAP concept as a critical organizational capacity for achieving innovation performance, we introduce insemination capacity, or the capacity of consulting firms to initiate and perpetuate a knowledge absorption sequence by the client firm. We define this concept, explore its dimensions, and stress its connection with absorptive capacity. Finally, we discuss the findings of this theoretical study and suggest further research on this concept.

1. The consulting-client Relationship in innovation contexts

To detail the framework of the relational context of this research, we consider the consulting–client relationship, acknowledge the specific implications of innovation contracts, and note the impact of service coproduction on the relationship.

1.1. Contractual consulting-client contexts

Whereas the concept of open innovation is relatively new, collaborations between firms and service providers have long sought to attain innovation outcomes. Research on innovative activity in the service sector still tends to be relatively recent (Gallouj and Weinstein, 1997; Den Hertog, 2000) and cites mainly management, strategy, and innovation consulting. Consulting implies a contractual relationship, unlike alliances or strategic partnerships, which entail some direct competition between firms. Thus supplier–client relationships can avoid some relationship issues, such as conflicting motivations (Cohen and Levinthal, 1990; Szulanski, 1996), in that the consulting firm and the client are entirely focused on the latter's performance, through their engagement in a classic, simple form of contract. The success of their collaborative relationship depends largely on the quality and strength of their interaction.

Prior research also offers several typologies of consultancy services, based on consultation orientations (Lippit, 1959), consultant profiles (Greiner and Nees, 1989), or learning intensity (Simonet *et al*., 2003). The latter element appears particularly relevant for our study, for three main reasons: the importance of knowledge for innovation, the support that a strong relational context offers for learning, and its dynamic characteristics. With these critical elements, the consultant–client relationship should result in value creation, in accordance with recent research that has reconsidered the role, nature, and practices of innovation consulting. In this sense, consultancy firms are not pure suppliers but rather innovation partners (Bettencourt et al., 2002), whose activity is based on their knowledge. As knowledge-intensive business services (KIBS), management, strategy, and innovation consultants enable a knowledge-based economy (Muller and Zenker, 2001). We adopt Muller and Zenker's (2001: 2) definition of KIBS as "firms performing, mainly for other firms, services encompassing a high intellectual added value" and thereby highlight the dissemination of valuable knowledge and input of private service providers.

1.2. Innovation context

To focus on innovation-related consulting services, we first need to clarify some terms to avoid any misunderstanding due to the problematic homonymy between services and service (Hatchuel, 1994). That is, "services" refer to companies from the service sector, or KIBS. The final outputs of such services include innovative product and service offerings. Innovation thus is a key conceptual dimension of KIBS (Muller and Doloreux, 2007). Den Hertog (2000: 508) investigates the roles of KIBS providers as facilitators, carriers, and sources of innovation, such that they play "a major role in initiating and developing innovations in client firms." This comment reflects the growing awareness of the importance of innovative activities in the service sector.

In turn, the client–supplier relationship is changing. Three main characteristics reflect this evolution in a product innovation context (Wognum *et al*., 2001: 342): increasing value added by suppliers, persistence in collaborative relationships, and greater mutual dependency as "the client has become more dependent on the knowledge, continuity, and care of the selected suppliers". These changes suggest a shift from a subordination to a partnership logic, such that the innovation-focused consulting relationship relies not on static or basic knowledge transfers but rather on dynamic synergies (Capello, 1999) that support the transfer of

intangible, tacit knowledge assets (Szulanski and Jensen, 2004) that often are sticky (Von Hippel, 1994 ; Szulanski, 1996).

The KIBS provider supports innovation through strong interactions with customers that determine the performance of the innovation project (Meeus *et al.,* 2001). Because the effectiveness of consultancy firms depends on their knowledge accumulation, creation, and dissemination abilities (Bettencourt *et al.,* 2002), their contract performance relies on the client's ability to deal with external knowledge. Yet clients may have difficulties absorbing this knowledge, mainly due to knowledge transfer challenges.

1.3. Coproduction of service and relationships

Despite relatively little attention paid to the dissemination capacity of knowledge sources (Minbaeva and Michailova, 2004), this ability is critical in a KIBS context, for which outward knowledge transfer is a core activity. We focus on the specifics of knowledge transfer in this context, to highlight the role of supplier behavior as a key determinant. In turn, a conventional view of knowledge sources and recipients is less relevant for our study context. The production of services results from a joint effort by the supplier and client (Den Hertog, 2000), which is likely a coproduction mechanism rather than a one-way process.

According to Bettencourt et al. (2002: 102), knowledge management "becomes a source of firm competence that serves as a competitive advantage for KIBS firms that are able to truly manage their customers effectively as co-producers of the service solution." Clients also are key actors (Todorova and Durisin, 2007), and the interaction of a supplier and a client determines the success of a consultancy contract (Schön, 1983), in accordance with the service-dominant logic (SDL; Vargo and Lusch, 2004). Although the SDL provides a more dynamic view of innovation consulting, we still recognize potential barriers for customers, such as a lack of time, skills, or motivation to meet value cocreation demands.

Considering this challenge, we conceive of the client coproduction level as a continuum, whose extremes reflect two kinds of interactions between the client and consultant. First, if the client does not participate in the project, the KIBS provider delivers "turnkey" service, which implies relatively poor performance in our innovation context. Open innovation projects rely on intensive interactions (Meeus et al., 2001), but on this end of the continuum, the client considers consulting firms only as suppliers, in a narrow sense of the term, and looks for operational outcomes from the KIBS. Second, the client may participate fully in

service creation, through strong interactions and long-term partnerships that lead to organizational learning for both partners and provide organizational learning benefits for the client (Barlow, 2000). In addition to these extreme cases, we need to consider intermediate levels and connections.

Innovative firms may engage service firms to gain access to valuable knowledge that is distant from their own knowledge base. Intellectual and valuable knowledge (Miles et al., 1995) also may be embedded in a particular context. However, even high-quality, appropriate external knowledge cannot guarantee clients' innovation performance. Rather, the exploitation of such external knowledge demands suitable integration mechanisms (Zahra and George, 2002), especially in connection with KIBS activities that "result in the creation, accumulation or dissemination of knowledge" (Miles et al., 1995: 18). Because KIBS knowledge is tacit (Nonaka and Takeuchi, 1995) and sticky (Szulanski, 1996), the client may have trouble absorbing it, though "the difficulty experienced in the process of knowledge transfer has received little systematic attention" (Szulanski, 2000: 10). Moreover, KIBS can drive development (Miles, 2005), so consulting firms seemingly should implement measures to enhance their knowledge dissemination or teaching abilities: "Although knowledge transfer involves both teaching activities by the source organization and learning efforts by the receiving organization, the literature on teaching is nearly absent in the management field, particularly when compared to the large body of literature on learning" (Zhao and Anand, 2009: 963). We suggest that suppliers knowingly and strategically use this ability to enhance client performance. As Koch and Strotmann (2008: 512) argue, "there is little systematical knowledge about what determines innovative activities in this new economic sector."

Therefore, in light of prior research on knowledge dissemination by service firms and their interactions with clients, we argue the contract success depends on knowledge absorption performance, which moderates innovative activity levels (Veugelers, 1997). Therefore, we consider absorptive capacity (Cohen and Levinthal, 1990), to explore the determinants of innovation performance arising from a service provider–client contract.

2. Absorptive capacity

Absorptive capacity affects performance in the form of technological transfers (Lin et al., 2002; Lichtenthaler and Lichtenthaler, 2009), innovation (Cohen and Levinthal, 1990; Tsai, 2001), transfers of best practices (Szulanski, 1996), and interorganizational learning (Lane

and Lubatkin, 1998). We accordingly present existing definitions of ACAP, review some of its antecedents, and explore the role of external knowledge sources for its development. In response to some identified research gaps, we also suggest an integrative model of ACAP in a contractual relationship context.

2.1. Models and definitions

Cohen and Levinthal (1990: 128) define absorptive capacity as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends." A broad consensus has developed around this definition, despite some major ACAP developments in the past two decades. Several reconceptualizations (Zahra and George, 2002; Todorova and Durisin, 2007), reifications (Lane et al., 2006), and operationalizations, including ACAP scale measures (Chauvet, 2003; Flatten et al., 2011), also have enriched understanding of the concept.

For example, Zahra and George (2002) consider ACAP as a four-dimensional dynamic capacity, such that a firm acquires, assimilates, transforms, and exploits external knowledge, as we summarize in Table 1. Acquisition entails the identification and acquisition of external knowledge; assimilation refers to the analysis and understanding of external knowledge. Knowledge transformation combines newly acquired knowledge with the organization's knowledge base. Finally, exploitation transforms knowledge into operations, such as new products and service development. In our study context, in which KIBS represent sources of innovation with substantial impacts on clients, this dynamic conceptualization is particularly relevant, because "it facilitates analysis of ACAP by enabling researchers to explore its different antecedents and consequences" (Zahra and George, 2002: 185). Moreover, these authors suggest that ACAP comprises two subsets, namely, potential (PACAP) and realized (RACAP) absorptive capacities. In our view, RACAP stresses the firm's ability to leverage external knowledge, which is critical for open innovation projects, particularly those emerging from contractual relations.

Another theoretical development of ACAP concept comes from Todorova and Durisin (2007), who reintroduce Cohen and Levinthal's (1990) idea of recognizing value as a component of acquisition dimension.

Table 1. ACAP dimensions: components and themes

(adapted from Zahra and George, 2002)

Dimensions	Components	Themes	Citations
Acquisition	Prior knowledge	Knowledge bases, experience of R&D department, education	Szulanski (1996); Autio et al., 2000; Zahra and George (2002)
	Prior investments	Risk tolerance, CEO support, R&D investments	Cohen and Levinthal (1990); Zahra and George (2002)
	Willingness to share knowledge	Value recognition, motivation, intensity and speed	Cohen and Levinthal (1990); Zahra and George (2002); Lane *et al.* (2006); Todorova and Durisin (2007); Lichtenthaler (2009); Flatten et al. (2011)
Assimilation	Understanding	Interpretation and confrontation	Cohen and Levinthal (1990); Szulanski (1996); Lane and Lubatkin (1998); Jansen *et al.* (2005); Todorova & Durisin (2007); Lichtenthaler (2009)
Transformation	Internalization and conversion	Recodification, questioning, integration	Szulanski (1996); Van den Bosch *et al.* (2003); Jansen *et al.* (2005); Lichtenthaler (2009); Flatten et al. (2011)
Exploitation	Use and implementation	Core competencies, harvesting resources.	Cohen and Levinthal (1990); Lane and Lubatkin (1998); Autio *et al.* (2000); Lane *et al.* (2006)

They argue that though Zahra and George (2002) consider ACAP a dynamic capability, their also omitted some dynamics aspects. Therefore, Todorova and Durisin (2007) introduce dynamic loops across ACAP dimensions, especially to reflect the complex relationship between assimilation and transformation, which is so dynamic that both dimensions can occur simultaneously or may be substitutable.

In addition to the need to adopt a dynamic view of ACAP in the context of innovation contracts and supplier–client relationships, we need more literature focused on ACAP antecedents, and specifically interorganizational antecedents (Volberda *et al.,* 2010), including the active impact of KIBS on clients' innovation performance.

2.2. ACAP antecedents

Two main streams of prior research investigate ACAP antecedents (Van den Bosch et al., 2003): one focused on prior related knowledge (e.g., contiguous knowledge levels, knowledge base similarities) and another pertaining to organizational mechanisms, routines (Lane and Lubatkin, 1998), or coordination capacities (Jansen et al., 2005). Across these streams though, most ACAP research remains static and assumes the capacity is internally generated (Cohen and Levinthal, 1990; Zahra and George, 2002; Todorova and Durisin, 2007). Knowledge "sources" appear as simple ACAP antecedents, due to their knowledge base, motivation, or level of prior related knowledge. Volberda et al. (2010: 27) thus call for research "to build on prior work addressing the nature of AC […] and inter-organizational antecedents so that there is an accumulation of knowledge about AC." This interorganizational nature of ACAP is a key dimension of the ACAP concept, related to the absorption of external knowledge. We seek to clarify the role of external sources in the development of absorptive capacity.

2.3. External sources

Although the gain of external knowledge and learning from partners are major components of inter-organizational antecedents of ACAP ACAP, the ACAP processes and how they change over time has not been investigating in detail (Volberda et al., 2010). We stressed the need to consider the role of external knowledge sources in the ACAP processes as efficient knowledge sharing depends on the absorptive capacity of the recipient (Cohen and Levinthal, 1990) but also "very much on the knowledge sender's attitudes and behaviour" (Minbaeva and Michailova, 2004: 666). But little research considers interorganizational contexts (Dyer and Singh, 1998; Lane and Lubatkin, 1998; Easterby-Smith et al., 2008). From an empirical investigation of collective research centers, Spithoven (2011) determines that the actors organize their absorptive capacity collectively. Lichtenthtaler and Lichtenthaler (2010: 158) propose the concept of desorptive capacity, or the "ability to identify technology transfer opportunities based on a firm's outward technology transfer strategy and to facilitate the technology's application at the recipient." According to this perspective, firms affect one another's ACAP, though Lichtenthaler and Lichtenthaler (2009) focus on the exploitation dimension, neglecting the other ACAP dimensions.

Considering their key role for innovation (Den Hertog, 2000), their "knowledge bridge" functions (Miles et al., 1995), and their intensive interactions with clients (Bettencourt et al.,

2002), we posit that KIBS exert a critical influence on absorptive capacity, through which they enhance contract performance by helping the client overcome its potential lack of absorptive capacity during the knowledge transfer (Szulanski, 2000). Unlike prior literature that presents knowledge sources as static ACAP antecedents, we acknowledge the active role of consulting firms in innovation contracts and argue that KIBS constitutes a critical support of the absorption process, such that it can initiate and perpetuate a knowledge absorption sequence. To address some existing limitations, we stress the need to develop an integrative model of ACAP that accounts for its construction at an interorganizational level, through the role of KIBS.

2.4. ACAP intégrative model

Although the gain of external knowledge and learning from partners are major components of inter-organizational antecedents of ACAP ACAP, the ACAP processes and how they change over time has To explore the role of KIBS for absorptive capacity, we build an integrative model based on relevant prior research, in which KIBS serve as ACAP coproducers in innovation contracts between the KIBS providers and clients. We retain Cohen and Levinthal's (1990) familiar definition, which entails the various elements of interorganizational learning processes (Lane and Lubatkin, 1998). However, whereas Cohen and Levinthal (1990) study the firm's capacity to absorb knowledge from a sector, Lane and Lubatkin (1998) address its capacity to absorb knowledge from other organizations. We also consider ACAP relative, such that it may vary with the knowledge absorption context.

We also recognize ACAP as a dynamic capability with four dimensions: acquisition, assimilation, transformation, and exploitation (Zahra and George, 2002; Todovova and Durisin, 2007). Although we do not consider assimilation and transformation substitutable, we follow Todorova and Durisin's (2007) dynamic model and stress the feedback loops across dimensions, such that each of the four dimensions can affect the others, and they do not necessary occur linearly. Finally, in line with our innovation contract study context, we do not assume that ACAP results entirely from internal efforts. Rather, external sources may actively affect ACAP; with this perspective, we study ACAP according to a "teaching" perspective and explore the active role of KIBS.

Our dynamic, integrative model stresses the need to account for how KIBS facilitates the initiation and continuance of a knowledge absorption sequence by clients

3. Insemination capacity

The importance of teaching activities has been largely neglected in the field of strategic management (Zhao and Anand, 2009). Building on related prior research though, we consider the role of consulting firms to initiate and perpetuate knowledge absorption sequences by the client, which we argue constitutes a dynamic capability of the consulting firm that we call "insemination capacity" (ICAP).

3.1. Definition of insemination capacity

Both knowledge transfer from the service firm and absorption by the client are critical. To explore the concept of absorptive capacity further, we focus on the consulting firm, or supplier, and propose an extended view of ACAP as ICAP. We argue that suppliers engaged in innovation contracts can act on their clients' knowledge absorption sequence, to enhance contract performance and the motivation of both firms.

Building on the research we summarize in Table 3, we define ICAP as a dynamic organizational capability developed by service suppliers through four dimensions: knowledge adoption, selection, contextualization, and preservation. By increasing their ICAP, KIBS providers can better invest their knowledge into the knowledge bases of their clients, such that they effectively teach clients how to exploit the available knowledge.

In turn, ICAP should produce two main outputs. First, it facilitates the initiation and perpetuation of a knowledge absorption sequence. That is, ICAP increases the client's ability to absorb knowledge through interactions with its supplier during the realization of the contract. We thus predict temporal developments of RACAP (Lane and Lubatkin, 1998), which are contextual, dependent on the service contract, and limited in the time. Second, ICAP may increase the RACAP of the client, especially if strong interactions occur between the partners. Even if the KIBS does not aim to strengthen the client's absorptive capacity, which is not its responsibility, this development represents a positive externality that occurs due to the intensive interactions between actors, such as when clients support service cocreation. Increasing client ACAP due to the supplier's ICAP likely affects innovation performance, because "firms with higher levels of ACAP are more effective in new product development" (Sun and Anderson, 2010: 140). In this case, ICAP refers not just to contract

performance but also new service contracts with innovative firms that have improved their ability to absorb external knowledge.

Ultimately, we argue that the ICAP dimensions comprise four complementary capacities. Following Eisenhardt and Martin (2000) and Zahra and George (2002), we suggest that these dimensions are idiosyncratic to the specific ways firms pursue, develop, and employ them. Our model also differs from most ACAP research, which assumes a linear, sequential process that ignores time-based effects (Van den Bosch et al., 1999; Todorova and Durisin 2007). By viewing ICAP as a dynamic capability, we frame our model accordingly and include feedback loops, which provide a better model of knowledge insemination in organizations.

3.2. Dimensions of insemination capacity

We propose four triggers of insemination capacity: adoption, selection, contextualization, and preservation. We derive these notions from empirical research into KIBS, consulting, innovation management, knowledge transfer, and absorptive capacity.

Knowledge adoption refers to the service firm's ability to recognize, pull, and adapt knowledge from clients. This mechanism aims to reduce the gap between the respective knowledge bases of both firms, by identifying valuable knowledge and drawing in external knowledge. In a sense, the supplier ACAP that Newey (2010) explores is part of this process, because the service provider absorbs knowledge from the client. Client collaboration is essential and determines the final outcome. Empirical research based on formal cooperation contracts also confirms that "access to knowledge from clients … has a significant impact on the probability to innovate" (Koch and Strotmann, 2008: 511).

Knowledge selection refers to the consulting firm's ability to select valuable knowledge for the client. Through interactive exchanges, providers build an estimation of the ACAP client to determine which knowledge to transfer, because it can be assimilated by the client. The main challenge for the provider is initiation stickiness (Szulanski, 2000: 13), that is, "the difficulty in recognizing opportunities to transfer and in acting upon them." Knowledge selection also implies KIBS retain some knowledge, such as sticky (Szulanski, 1996) or tacit (Nonaka and Takeushi, 1995) forms, which may affect knowledge absorption effectiveness.

Knowledge contextualization refers to the provider's ability to adapt the knowledge to the context of the client organization. Knowledge stickiness remains a key issue (Szulanski, 1996). Therefore, providers seek to make the knowledge as explicit as possible, to avoid

assimilation issues. They also may adapt and internalize knowledge from the client organization, which strengthens their bond (Hansen, 1999).

Finally, knowledge preservation for our purposes does not refer to its traditional meaning in innovation literature, according to which firms protect their key knowledge from competitors or partners. Rather, in an ICAP setting, it seeks to preserve the created value from threats created by the client as the transfer unfolds. Innovative firms may go astray (e.g., from the initial goals of the contract) as they transform and exploit external knowledge. This preservation role likely is complicated for the supplier, because it occurs when the transfer unfolds, whereas "once the recipient has obtained satisfactory results, it progressively needs fewer interactions with the source" (Szulanski, 2000: 13).

Through our introduction of these four dimensions of ICAP in an integrative model, we also seek to clarify some key elements. First, we reject the idea of a sequential absorption process, as suggested by mainstream literature. Rather, both ACAP and ICAP represent discontinuous processes involving multiple iterations. Second, we recognize the close bonds between insemination and absorption capacities and their dimensions. Third, we acknowledge two main dimensions that are inseparable from ICAP, though not core dimensions. That is, knowledge cocreation mechanisms are critical, because clients are always involved in the service (Den Hertog, 2000; Bettencourt et al., 2002). Also, knowledge transfer is a primary ICAP tool, in that it helps establish bonds between the ICAP mechanisms and the four stages of the knowledge transfer process, as suggested by Szulanski (1996): initiation, implementation, ramp-up, and integration.

3.3. Connexions between ICAP and ACAP

Because ICAP is based in ACAP literature, such that it represents a complementary, conceptual extension of the original concept, we clarify their connections, which suggest links on several levels. In particular, KIBS rely on their own ACAP to inseminate knowledge in their clients. Furthermore, the alignment of ICAP and ACAP dimensions depends on the nature of the relationship, such that the KIBS can adjust the level of ICAP, contingent on the client's absorptive capacity.

3.3.1. ICAP is partly based on the supplier's absorptive capacity.

The insemination capacity of the KIBS depends partly on external knowledge. Even if service

coproduction takes place at a lower level, the KIBS must absorb primary contextual knowledge, such as contract specifications. This point attests to the relevance of suppliers' absorptive capacity, as introduced by Newey (2010). We argue that KIBS cannot develop their own ICAP if they are unable to absorb external knowledge from their customers. In particular, KIBS absorptive capacity is critical for the knowledge adoption and contextualization dimensions of ICAP: Adoption aims to recognize, derive, and adapt knowledge from customers, while contextualization encourages knowledge transfers from both firms. Therefore, the absorptive capacity of KIBS is a key antecedent of ICAP; it could even represent a proactive absorption capacity.

3.3.2. Insertion of ICAP into ACAP dimensions.

We suggest that KIBS do not mobilize ICAP dimensions or affect clients' ACAP dimensions similarly; rather, these effects depend on whether they are engaged in contracts in which the customer is slightly or fully engaged in the co-creation process.

In the former case, KIBS influence the ACAP of their clients directly, through the gateway of the exploitation dimension. The customer does not take part in the cocreation process but instead seeks turnkey knowledge, ready to exploit. We argue knowledge preservation is not relevant in this case, because such knowledge is unlikely to deteriorate.

In the case of strong codevelopment contracts, KIBS take full part in the early dimensions of ACAP. The customer is more likely to affect the value of knowledge, because it must recognize, assimilate, and transform external knowledge from the KIBS. The preservation dimension of ICAP makes far more sense in this case.

3.3.3. Adjusting ICAP to the customer's ACAP level.

Various factors drive up the level of ICAP, as developed by the KIBS through contracts. The level of the client's ACAP should be particularly critical, so KIBS should account for the client's ACAP in adjusting their own level of ICAP. Extant literature offers controversy, such that some researchers argue that a lack of absorptive capacity limits performance (Szulanski, 1996) while others posit that "optimum absorptive capacity is never equal to maximum absorptive capacity" (Volberda et al., 2010: 26). Overall though, KIBS must seek some kind of balance. If the ICAP level developed by the KIBS is too low, the client cannot absorb the knowledge. Even when developing the client's ACAP is not a primary goal of the KIBS, it

recognizes that too much ICAP may limit organizational learning and "weaken" the client's ACAP, which can affect contract performance across both firms.

3.3.4. Correspondences between ICAP and ACAP dimensions.

The ICAP model might be misleading if taken at face value: Its four dimensions do not automatically coincide with the four dimensions of the ACAP model. Rather, it is difficult to identify precise correspondences between the ACAP and ICAP dimensions. The ACAP process remains unclear, and progress in identifying the various influences on ACAP has been less than sufficient (Van den Bosch et al., 2003). Correspondingly, the ICAP process also demands further empirical investigation. In particular, even if the logical process seemingly would move from the individual to organizational level, we suggest that all dimensions likely influence one another, without necessarily occurring linearly. Furthermore, the ICAP dimensions may be more likely to affect the overall knowledge absorption process, especially in terms of realized absorptive capacity. Finally, because it is so difficult to establish strong correspondences among the respective dimensions, further empirical and quantitative research is needed to address the links between ICAP and ACAP dimensions.

3.4. Knowledge transfer and insemination capacity

Knowledge transfer performance relates positively to the firm's absorptive capacity (Chen, 2004). Thus, we need to clarify the differences between these concepts, to resolve any possible ambiguity and stress the value of the ICAP concept. No consensus definition of knowledge transfer is available, and disparate notions appear embedded within this term, such as the characteristics of the donor and recipient firms, knowledge characteristics, the knowledge process, and relationships across units (Berthon, 2001; Easterby-Smith, 2008; Grant, 1996).

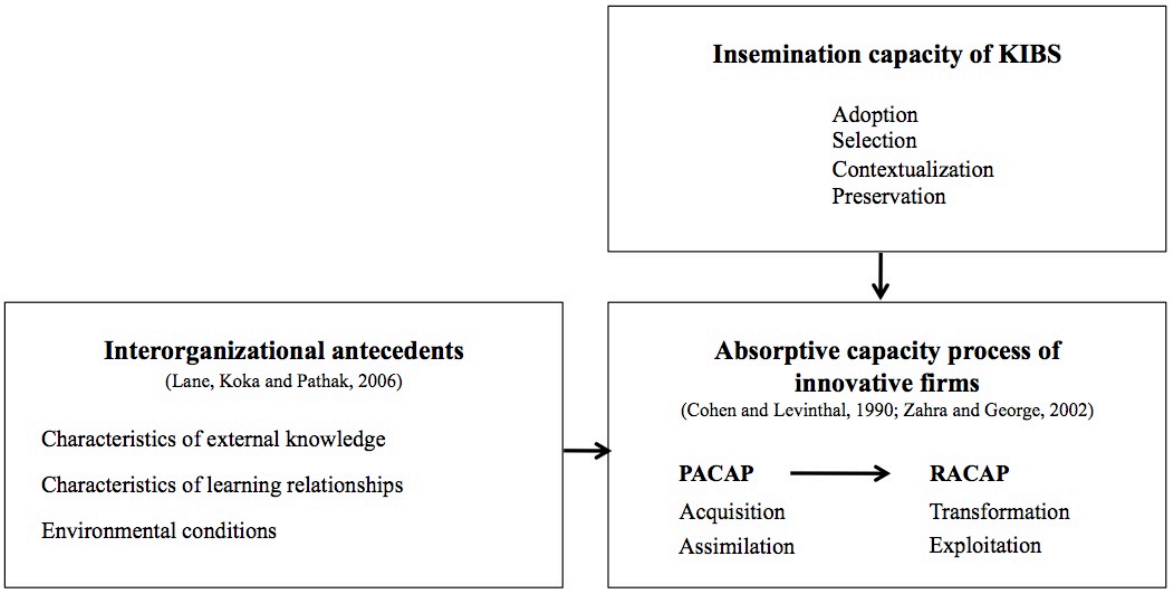
This research does not consider knowledge transfer at the same level as ICAP. That is, both processes seek to improve contract performance, but we regard ICAP as a lever that the consulting company can use to initiate and perpetuate a knowledge absorption sequence by the client. This view has several major implications.

First, we argue that ICAP offers a more dynamic view of knowledge interactions between a consultant and clients than knowledge transfer can. That is, the two types of knowledge-based interactions in an innovation process are knowledge transfer (static) and collective learning

(dynamic) (Todling et al., 2009). Knowledge transfer is a communication-oriented process between the sender and the receiver (Szulanski, 1996). Such a static process is not relevant in innovation contracts, in which both firms coproduce the service. Instead, ICAP is a dynamic capacity, based in mutual learning and knowledge sharing, processes, and competencies. Knowledge transfer still plays a critical role, through the ICAP dimensions of adoption and contextualization. In this sense, we argue that knowledge transfer is a key insemination capacity resource, which results from several complementary processes.

Second, we stress that one of the main ICAP characteristics refers to a kind of teaching activity that remains notably absent of the literature (Zhao and Anand, 2009). Thus, we posit that ICAP represents a link between knowledge transfer and its effective performance to address the need of linking intra-organizational knowledge transfer and performance. In particular, most theories of knowledge transfer focus on the dissemination process, ignoring its absorption by the recipient. In other words, it focuses on potential absorptive capacity (Zahra and George, 2002) but does not take into account realized absorptive capacity. The ICAP concept embraces both of these subdimensions of absorptive capacity, in response to Easterby-Smith et al.'s (2008: 684) call for research that focuses not just "on knowledge transfer, but also on the transformation and integration of knowledge into commercial innovation. Hence, we could be looking for a wider view of inter-organizational knowledge transfer.

Figure 2. Integrative model of insemination capacity



Third, literature on knowledge transfers mainly uses a single level of analysis, despite widespread recognition that it is a multilevel process (Zhao and Anand, 2011). Therefore, knowledge transfer models cannot reflect the richness of absorptive capacity.

We distinguish ICAP from knowledge transfer, in terms of purpose, nature (process vs. dynamic capacity), level of analysis, and correspondence with absorptive capacity. In so doing, we argue that ICAP represents a specific kind of organizational learning and propose an integrative model of ICAP.

Conclusion

The growing importance of knowledge-intensive business services as innovation coproducers emphasizes the influence of absorptive capacity on service performance. In response, we chose to explore ACAP from the original perspective of the supplier. We have proposed the concept of knowledge insemination capacity, which refers to the supplier's ability to initiate and perpetuate a knowledge absorption sequence for its client. Although it is not the aim of the KIBS and depends on various elements of the innovative company that will carry out the project (e.g., degree of cocreation, intensity of knowledge transfer, motivational factors), ICAP can increase the client's level of absorptive capacity, as a positive externality.

With this theorization, this research illustrates the importance of considering KIBS as key elements of ACAP, in the sense that the insemination performance of the supplier affects the knowledge absorption performance of the client. We also argue that knowledge absorption effectiveness constitutes a kind of complementarity between the insemination and absorption capabilities of suppliers and clients. Both elements may help explain successful, as well as failed, innovation contracts.

Further research should seek to expand and deepen the ICAP concept, across multiple views and perspectives. For example, empirical research might investigate the mechanisms and processes that KIBS use to prompt the start of a knowledge absorption sequence. Because the interaction between the service firm and its client represents a key element of the knowledge absorption process, we suggest further research that adopts a dynamic view, to deepen our understanding of the interdependencies across the respective ICAP and ACAP dimensions.

Finally, in reference to the outcomes of insemination capacity for organizational learning, we argue that KIBS, despite their primary goals, actually help clients develop their own

absorption routines, which implies that they provide services beyond the contract. Further research might develop scales to measure the precise ACAP evolution of the client firm.

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