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Open Innovation Implementation in the Service Industry: Exploring Practices, Sub-practices and Contextual Factors

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Abstract. This paper addresses a major gap in reported research on open innovation (OI) literature: How do service firms adopt open innovation? This research focuses on data from eighteen service SMEs in Belgium from high-tech and knowledge-intensive service industries. Based on analysis, we find new insights regarding open innovation practices (i.e., inbound and outbound) and sub-practices (i.e., acquiring, sourcing, selling and revealing) for service firms. More specifically, the study showed that service SMEs are more inclined to use inbound practices due to reasons associated with firm size, industry, and knowledge intensity in the market, whereas the decision about which sub-practice to adopt seems to be strongly influenced by the type of actor, the firm's vulnerability and internal managerial skills, and the existence of complementarities. Thus, we contribute to OI literature as well as capability literature through providing initial insights regarding the adoption of OI by service firms.

Keywords. Open Innovation Adoption, Service Industry, SMEs, Inbound, Sourcing, Acquiring.

1. Introduction

Service innovation management in current hypercompetitive markets are considered to be important challenge for many service firms. This challenge is due to need to simultaneously consider multiple interrelated changes, such as organizational innovation, the involvement of multiple actors in the process of innovation, and the codification of knowledge for innovation. Although prior literature provides limited inputs, it acknowledges the importance of understanding the interaction between the various actors in the process of service innovation. Some service companies (mostly technology-based businesses) have been trying to break their boundaries through implementing a more open innovation processes. The emerging literature on open innovation (OI) captures such developed and is defined as *"the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for [the] external use of innovation, respectively*" (Chesbrough 2006; Chesbrough 2006). Two reasons motives companies to adopt OI approach. First, it can reduce the time to market and R&D-related costs. Second, firms can utilize an external path to market for internal developments that enables them to capture the benefits of their R&D investments (Huizingh 2011). The openness of the innovation process has been identified as one of the key success factors of service firms (de Jong et al., 2003; Du et al., 2014). Using OI, service firms can overcome barriers to

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innovation by acquiring and utilizing external resources to drive innovation output (de Jong et al., 2003).

Notwithstanding a recent increase in the number of OI publications, OI in the service industry has remained under-investigated (Evangelista and Savona 2010; Trigo and Vence, 2012)In this study, we argue that OI within service firms is widely recognized as different from OI in manufacturing firms (van de Vrande et al. 2006; Tether and Tajar 2008; Mention 2011). For example, service firms' heterogeneity, intangibility and customer-centric nature are expected to influence how innovation emerges and can be managed (Wilson et al., 2008). Thus, many recent studies have called for the investigation of OI in the service industry through developing the knowledge pertaining to open service innovation (van de Vrande et al., 2006; Gassmann et al., 2010; Vanhaverbeke et al., 2014).

We are still in early stages of understanding OI in services firms and several questions remain unanswered regarding how service firms adopt OI. Previous studies have shown that OI adoption is not dominated by any one type of firm, and it was found to depend on various factors, such as innovation needs, the organizational culture, the country, the industry, the timing of the implementation, etc. Few qualitative studies (e.g., Christensen et al., 2005; Neyer et al., 2009) and quantitative studies (van de Vrande et al., 2009a) have been devoted to that issue. Most studies on the adoption of OI have focused on large manufacturing firms, such as those presented by Chesbrough (2003)-i.e., Lucent, IBM, Intel and Millennium Pharmaceutical-DSM (Kirschbaum, 2005), P&G (Dodgson et al., 2006; Huston and Sakkab, 2006), and ItalCementi (Chiaroni et al., 2011). Several quantitative studies have been conducted in German-speaking countries, including Switzerland (Keupp and Gassmann, 2009), and in the Netherlands (Poot et al., 2009). However, despite the potential advantages of qualitative cross-company analysis (Eisenhardt, 1989), few studies have focused on OI practices in service firms (Mortara and Minshall, 2011). Furthermore, understanding under which circumstances formal or informal open innovation practices and sub-practices are adopted has been emphasized as a top research priority, but empirical studies that focus on that topic are still lacking (Enkel et al., 2009; Wikhamn, 2013; Henkel et al., 2014; West et al., 2014). This paper will thus focus on the process of OI, by analyzing the OI- practices and sub-practices implemented by services SMEs (Huizingh, 2011) and the context, by analyzing when these practices and sub-practices are implemented by services SMEs (Huizingh, 2011). This study attempts mainly to understand how and when OI should be implemented by services SMEs (Enkel et al., 2009; Huizingh, 2011). Indeed, firms need to learn routines to effectively implement OI practices and sub-practices (Vanhaverbeke et al., 2008). Taking such perspective enables us to contribute beyond OI literature towards capability development literature, which suggests that firms can secure competitive advantage through developing unique and inimitable routines and processes. (Helfat and Peteraf, 2003).

This paper addresses a gap in the OI literature with regard to service industry (Gassmann, 2006; Chiaroni et al., 2010, 2011). Consequently, in this study, we take an integrative perspective on OI adoption by developing a framework to analyze the practices and related sub-practices adopted by service firms in general and particularly of eighteen service SMEs in Belgium. Multiple case studies have been designed to involve firms from high-tech and knowledge-intensive service industries, in which OI practices are prevalent (Parida et al., 2012). This sample warrants an in-depth cross-company analysis. Furthermore, we argue that SMEs are particularly relevant for this study because they represent 99.8% of the firms in Belgium (3) and because previous OI studies have primarily focused on large firms (van de Vrande et al., 2006; Lasagni 2012; Parida et al., 2012). Moreover, service SMEs account for 57.7% of all firms in Belgium and contribute significantly to the national economy.

OI is beneficial and valuable for SMEs because it can assist such firms in overcoming size-related liabilities and ensuring competitiveness (van de Vrande et al., 2006; Bianchi et al., 2010). However, numerous factors can complicate the adoption and implementation of OI within SMEs, which is not as much of an issue in larger firms. For instance, many size-related factors (e.g., time or resources) are expected to reduce the adoption and output of OI for SMEs (van de Vrande et al., 2006). Moreover, SMEs increasingly practice OI through the integration of external resources; therefore, a more detailed understanding of these practices would be appropriate and relevant (Gassmann et al., 2010). Consequently, services SMEs represent a suitable target sample for the current study.

This article is structured as follows. First, the literature on OI practices and on OI in the service industry is reviewed. In the next section, we propose a framework to analyze the practices and sub-practices adopted by service firms. Then, we explain the research methodology. This is followed by the presentation of our empirical results and discussion. Finally, conclusions, limitations, and suggestions for further research are presented.

2. Literature review

2.1. OI Practices

Understanding the richness of the OI paradigm requires a study of the factors that drive firms to implement different OI practices (Dahlander and Gann 2010; Huizingh 2011). OI is divided into two categories of practices: outbound OI and inbound OI (Gassmann and Enkel 2004; Chesbrough 2006; Huizingh 2011; Drechsler and Natter 2012). Outbound OI refers to the process of using an external path to market for internal developments (Chesbrough 2006; Chesbrough 2006; Dahlander and Gann 2010; Parida et al., 2012). It includes activities such as out-licensing or selling IP, forming alliances, and creating spin-offs (Gassmann and Enkel 2004, Lichtenthaler and Ernst 2007). Outbound OI can be risky because it involves the divulging of expertise by a firm, which entails the risk of strengthening the market positions of competitors of the firm in question (Rivette and Kline, 2000). The benefits of outbound OI can be both monetary and strategic (Bidault 2004; Lichtenthaler and Ernst 2007). Inbound OI is, however, linked to the exploration and integration of external resources for internal development (Chesbrough 2006; Chesbrough 2006, Dahlander and Gann 2010; Parida et al., 2012). It includes activities such as networking, inter-firm collaboration, customer involvement, and the purchase of licenses from other organizations (Parida et al., 2012). Through inbound OI, firms can obtain access to new, complementary, and unique resources (Gassmann and Enkel 2004). This practice can be expensive because it requires time, money and the ability to effectively use external resources and knowledge (Madhok 2002; Bapuji et al., 2011).

Both practices can be beneficial, but firms more frequently practice inbound OI than outbound OI (ven der Meer 2007; Huizingh 2011). However, a few firms have reported engaging in both practices simultaneously. This behavior may reflect the complementary nature of the two types of OI (van de Vrande et al., 2006; Enkel et al., 2009). However, there is a lack of understanding of outbound practice, although it can produce high revenue (van de Vrande et al., 2006; Parida et al., 2012). Therefore, the determinants of the choice to implement particular OI practices are important because the context can influence a firm's decision (van de Vrande et al., 2006; Gardet and Fraiha, 2012).

2.2. Open innovation in the service industry

In addition to manufacturing firms, OI also holds value for service firms (van de Vrande et al., 2006; Mention, 2011). The openness of the innovation process has been identified as one of the key success factors of service firms (de Jong et al., 2003). Using OI, service firms can overcome barriers to innovation by acquiring and utilizing external resources to drive innovation output (de Jong et al., 2003). Despite the relevance of OI to service firms, there remains a lack of theoretical knowledge pertaining to open service innovation (Gassmann et al., 2010; Chae, 2011).

Prior studies have indicated that OI adoption in services can differ greatly from adoption in manufacturing firms for many reasons. First, the intangibility of services renders communication more difficult (Chesbrough and Davies, 2010) and requires close ties with the stakeholders involved (Hsueh et al., 2010). Because of their offerings' intangibility, service firms are resorting to copyright and confidentiality agreements as methods of protection rather than using patents, which are usually used in the manufacturing sector (Rubalcaba et al., 2010). Consequently, it is interesting to investigate how service firms will address intangibility to coordinate the parties involved in OI projects and to protect their outputs.

The simultaneity of production and consumption are also expected to affect OI implementation in the service industry (Chesbrough and Davies, 2010). This dimension is crucial given the highly interactive nature of OI practice. The study of OI practices and sub-practices in service firms is closely linked to the need to consider innovation management in services more systematically (Toivonen, 2010).

Many OI researchers have acknowledged the importance of understanding OI in the service industry (van de Vrande et al., 2006; Tether and Tajar, 2008; Chesbrough and Davies, 2010; Gassmann et al., 2010; Huizingh 2011; Love et al., 2011; Mention 2011; Salavisa et al., 2012; Trigo and Vence, 2012). Consequently, a thorough review of OI literature from 2002-2012 was conducted. A topic search option was used in EBSCO and Science Direct to search for scientific publications that contained the combination terms "open", "innovation" and "service" in the title, keywords or abstract fields. The research included only publications of the document type "article" in the categories of social sciences, business and management.

The initial research efforts resulted in a set of 53 publications. However, the topic search option captured not only publications that contained the combined terms "service open innovation" but also those that simply contained the three words separately. Only empirical papers have been retained; theoretical papers, literature reviews and books have been excluded. An ex-ante normative judgment with regard to whether the publications address the studied concept was performed. This stage yielded eight relevant studies, which are presented in table 1. Finally, eight articles have been included in this literature review. Those articles were published in three journals: "Research Policy" (3 articles), "Technovation" (4 articles) and "International Journal of Innovation Management" (1 article). These articles have been classified based on the practices studied. It can be observed that previous research focused mainly on inbound practices in service industries. Outbound OI was discussed in only two articles.

Prior literature on inbound OI studied many types of activities: (1) cooperation (Tether 2002; Mention 2011; Mention and Asikainen 2012; Trigo and Vence, 2012), (2) knowledge sourcing (Love et al., 2011; Mention 2011; Mention and Asikainen; 2012), (3) networking (van de Vrande et al., 2006; Salavisa et al., 2012) and (4) customer involvement, outsourcing R&D and licensing IP from other firms (van de Vrande et al., 2006) as types of inbound OI practices. Venturing, licensing to other firms and participating with other firms have been studied as types of outbound OI practices (van de Vrande et al., 2006). Love et al (2011) also considered both

outbound and inbound OI practices, but they did not indicate how these practices were adopted; they focused instead on the types of partners involved rather than on the way these companies involved the stakeholders.

Cooperation as inbound OI practice is defined as "*active participation in joint R&D and other technological innovation projects with other organizations*" (Tether 2002; Mention 2011). Tether (2002) investigated the factors that influence UK firms' adopted cooperation mode of innovation. It appears that the firm's size, its sector of activity, its level of R&D, its innovation behavior, its experience with innovation and the type of innovation introduced affect the firm's propensity to adopt the cooperation practice of OI (Tether 2002). The firm's motive to decrease the risk associated with innovation leads these firms to cooperate with customers and competitors. Mention (2011) studied the cooperation partners of service firms and their effect on the degree of novelty. The author showed that cooperation with science-based partners influences the degree of novelty of the innovation. Cooperation with the other types of partners (competitors, market-based partners and companies within the group) do not significantly influence the degree of novelty of the innovation project. Mention and Asikainen (2012) studied the effect of cooperation and information sourcing on innovation intensity and sales. They showed that cooperation with market players is positively related to innovation intensity in the firms and with sales. Finally, Trigo and Vence (2012) have shown that the cooperation mode adopted by service firms depends on the innovation type and the sector of activity and will influence the partners integrated in the innovation project.

Sourcing is a less formal type of inbound OI practice. Love et al (2011) emphasized that knowledge sourcing from customers will affect the number of ideas available in the first stage of the innovation process. Knowledge sourcing from other partners does not have a significant effect on the early stage of the innovation process. Information from market-based partners, from firms within the group and from competitors positively influences the degree of novelty of the innovation (Mention 2011) in service firms. In another study, it was found that information from market players influences the firm's innovation intensity, whereas information from competitors influences the firm's sales (Mention and Asikainen, 2012)

Networking is another type of inbound OI practice. Salavisa et al (2012) studied formal and informal networks in service firms (biotechnology and software). Formal networks are adopted more frequently than informal network. Indeed, an informal network requires strong ties. Informal networks are mainly adopted by biotechnology firms in connection with universities and by software companies in connection with firms from the same sector. Regarding the other types of inbound OI practices, customer involvement and network usage in the innovation process appears to be the most adopted practice by SMEs. Licensing IP from other firms is more frequently practiced by manufacturing firms than by service firms (van de Vrande et al., 2006).

Regarding outbound OI practices, van de Vrande et al., (2006) find that whereas outbound practices are increasingly adopted by SMEs, the adoption rate of outbound practices is stable. There is a significant difference between service firms and manufacturing firms to adopt outbound OI practices. Love et al (2011) emphasized that service firms generally use outbound practices during the second stage of the innovation process to transform resources into marketable innovation.

The literature on OI practices in service firms shows contradicting results regarding (1) the factors that influence the adoption of different types of inbound OI practices and (2) these factors' effect on a firm's performance indicators (Mention and Asikainen, 2012; Trigo and Vence, 2012). It is largely recognized that such discrepancies may be due to a lack of understanding/conceptualization of OI (Dahlander and Gann, 2010; Wikhamn, 2013). Indeed, inbound and outbound practices are broad concepts, and some managers may be confused regarding the

types of practices it includes (Dahlander and Gann, 2010). Services' characteristics may also lead companies from the sector to implement some forms of inbound and/or outbound OI practices. Indeed, because services are intangible, they are more difficult to protect than products. Consequently, these firms may rely more heavily on formal types of practices. Moreover, it appears that service firms may practice outbound OI (van de Vrande et al., 2006; Love et al., 2011), but few studies have considered this type of openness. Consequently, there is a need to study OI in services within a clearly defined framework. This study attempts to extend the understanding of how service firms implement OI by focusing on OI practices and their associated processes that are crucial to understanding the service context. Furthermore, this study attempts to understand why some practices and sub-practices are adopted by services SMEs and others are not adopted. To meet this objective, we will define a framework to identify OI practices and sub-practices in the next section.

Table 1. OI practices and activities in the service industry-Literature review

OI practices	Open innovation activities	Articles
Inbound	Cooperation	Tether, 2002; Mention, 2011; Mention and Asikainen, 2012; Trigo and Vence, 2012
	Customer involvement	van de Vrande et al., 2006
	Networking	van de Vrande et al., 2006; Salavisa et al., 2012
	Outsourcing R&D	van de Vrande et al., 2006
	License IP to other firms	van de Vrande et al., 2006
	Broadly defined	Love et al., 2011
	Coopetition	Mention, 2011
	Information sourcing	Mention and Asikainen, 2012
	Inter-firm relationships	Hsieh and Tidd, 2012
Outbound	Venturing	van de Vrande et al., 2006
	License IP to other firms	van de Vrande et al., 2006
	Participation in other firms	van de Vrande et al., 2006
	Broadly defined	Love et al., 2011

2. Development of the OI framework

Two main dimensions have been used in theory to classify OI practices: (1) inbound vs. outbound OI and (2) the controlled vs. the 'libre' perspective (Bass and Avolio, 1997; Wikhamn 2013). The proposed framework has been adapted from Dahlander and Gann (2010) to better represent the specificities of the service sector. Indeed, whereas the authors of the original article made the difference between exchanges that involve money and exchanges that do not involve money, we used the distinction between 'libre' and 'controlled'. This dimension has been proposed by Wikhamn (2013), who defines 'libre' openness as the "*availability of ongoing, socially*

constructed knowledge, permitting any users to access, add and modify it without legal or technical barriers". The idea behind 'libre' openness is that resources are freely available to everyone (Wikhamn, 2013). The second perspective, 'controlled openness assumes that resources can be shared under the control that is established through setting the price (Wikhamn, 2013). It has to be noted that 'libre' is not the opposite of controlled. Indeed, 'libre' does not mean uncontrolled or without protection. It is more related to the idea that knowledge is diffused in the society "*with the aim of transparency, accessibility and freedom of use*" (Wikhamn, 2013). In the 'libre' perspective, mechanisms such as intellectual property rights (IPRs) may be used by companies to protect openness (Wikhamn, 2013). The concept of open as 'libre' is related to the concept of free software, free culture, open science and open access. The 'controlled' openness is related to IP strategies to concept such as open IP platforms (Wikhamn, 2013) We suggest that these two perspectives are related to but are different from the perspective suggested by Dahlander and Gann (2010). Indeed, 'libre' openness does not mean that services are without the exchange of money but that they are freely available in an idea of transparency (Wikhamn, 2013). Given the intangible nature of services, firms may want to keep the control(Dahlander and Gann 2010). However, control is not necessarily associated with an exchange of money, as stated by Wikhamn (2013), because companies may use other mechanisms to protect their resources. Salavisa et al., (2012) also made the distinction between formal and informal networking for open innovation. However, they suggested that formal networks were established between organizations and informal networks between individuals. In this study, we argue that both may be adopted by services SMEs, with any type of stakeholder. We also argue that informal networking is not the same as uncontrolled networking. Indeed, firms may depend on each other to develop an innovation. In that case, both firms may keep the control without establishing a formal cooperation. This new way to classify the sub-practices of inbound and outbound OI may explain the divergences find in the literature on OI in the service sector.

Four related innovation sub-practices (or forms of inbound and outbound OI practices) have been highlighted. Acquiring and sourcing are related to inbound practices, whereas outbound practice is operationalized through revealing and selling. The various sub-practices are clearly defined in the following table.

Table 2: The OI practices and sub-practices (adapted from Dahlander & Gann, 2010)

	Inbound innovation	**Outbound innovation**
Controlled perspective	**Acquiring** How do firms access or in-license in external resources/knowledge?	**Selling** How is innovation developed internally sold/out-licensed?
'Libre' perspective	**Sourcing** How do firms use external resources for internal development?	**Revealing** How do firms reveal internal resources/knowledge to the external environment without immediate reward?

Through acquiring, companies obtain input(s) for innovation through the marketplace. This sub-practice is implemented when a firm wants to retain control over a set of elements in its OI-related interactions (Garavelli et al., 2013). Acquiring includes activities such as in-licensing, co-operating, formal networking, and outsourcing R&D. On one hand, acquiring external knowledge allows the company to reduce their time to market and uncertainty (Dahlander and Gann, 2010; Wang and Li-Ying, 2014). On the other hand, it requires firms to be able to manage the search for and evaluation of external ideas that can be integrated into the innovation process and to

control the distance between themselves and their external inputs (Sapienza et al., 2004; Dahlander and Gann, 2010). An excessively large gulf between a firm and its external inputs will create difficulties in aligning these inputs with current firm practices, whereas external inputs that are overly similar to a firm's current knowledge will reduce the possibility of combining available inputs in a manner that generates new and innovative outputs.

Sourcing is related to the use of ideas and technologies sourced from outside of a firm through, for example, participation in external innovation projects (Chesbrough, 2006). Sourcing includes activities such as informal networking and customer involvement. Through this sub-practice, firms can benefit from complementarities to which they would otherwise not have access (Dahlander and Gann, 2010). Firms can also benefit from creative ideas from external actors and obtain opportunities to develop and market new products or services (Garavelli et al., 2013). However, the knowledge that a firm can acquire through sourcing is limited. Indeed, the relationship between searching activities and innovative performance is curvilinear (Laursen and Salter, 2006).

Through revealing, a firm reveals its own resources without reaping immediate rewards and without having real control over the use of this information (Henkel, 2006; Wikhamn, 2013). Revealing has been extensively discussed in the context of open sources software (Henkel, 2006). Indeed, it may be required for successful OI and/or when legal protection is ineffective (Henkel et al., 2014). Revealing can be beneficial because it can generate incremental innovation within a particular industry (Murray and O'Mahony, 2007; Dahlander and Gann, 2010). It can also lead to cumulative advantages. Indeed, by focusing less on innovation protection, a firm can increase the use of its products/services, including external knowledge that can be integrated into its pool of knowledge. On the other hand, there is the risk that knowledge will be leaked to competitors. Moreover, the benefits are difficult to reap, and firms have to determine which resources will be revealed (Laursen and Salter, 2006; Dahlander and Gann, 2010).

The last form of openness, known as "selling", includes activities such as venturing and licensing intellectual property to other firms. Through these sub-practices, firms share or license internal resources to become commercialized them. Selling is increasingly adopted by managers (Mazzola et al., 2012). However, there are risks involved in providing critical information to potential customers. Firms must be able to appropriately utilize the potential value that is associated with sharing a particular resource (Arrow, 1971; Dahlander and Gann, 2010).

The above typology has been used to explore and analyze the adoption of OI within service firms. Beyond these practices, the related sub-practices have also been deeply studied. This framework is considered a foundation to a better understanding of the contextual drivers of the strategic selection of OI practices and sub-practices.

3. Methodology

A qualitative research method was adopted because it permits the understanding of complex social phenomena that are associated with real-life events (Yin, 2009). To identify and understand how service firms engage in OI practices and sub-practices and how these choices are influenced by certain contextual factors, we conducted multiple case studies (Baxter and Jack 2008; Yin 2009). This methodology decreases the likelihood of randomness and facilitates investigators to identify and study patterns across multiple cases.

In a total of eighteen SMEs (small and medium-sized enterprises) from high-tech (15 firms) and knowledge-intensive service (3 firms) industries from Belgium were

selected for this study. Two criteria were set in the choice of the case firms: (1) The firm had to have integrated external actors within its innovation process for at least one innovation project (Bass and Avolio, 1997), and (2) the firm must have commercialized/implemented this innovation. The cases were chosen through the use of replication logic, which emphasizes the similarities and differences within and between groups (Eisenhardt, 1989; Yin 2009). The case firms are members of Belgian organizations that promote collaboration (cluster and "pole de compétitivité) between companies.

The case SMEs were classified according to the innovation types that were achieved during each project (process or service innovation) and according to the degree of novelty (radical or incremental) because these criteria have been suggested as influencing the OI (Huizingh, 2011). Following the typologies of Gradey et al (1995) and Avontalis et al (2001), service modification, service line extensions, and service repositioning are grouped into the service innovation category, whereas architecture innovation, platform innovation, and (new or improved) delivery processes are referred to as process innovation. Moreover, based on the categorization adopted by Parida et al (2013) and Laursen and Salter (2006b), we view radical innovation to be related to a *"new-to-the-world"* innovation and incremental innovation to be related to a *"new-to-the-firm or significantly improved"* innovation. This framework allows for capturing a different degree of innovation or novelty through case firms. Having access to cases that are spread across innovation types and degree of novelty adds variation to our sample. Thus, six innovations were classified as radical process innovations, five as radical service innovations, one as an incremental process innovation, and six as incremental service innovations.

To obtain rich empirical data, we used multiple data sources (Baxter and Jack, 2008; Yin, 2009). Most data were collected through semi-structured interviews (duration on average: 90 minutes). The interviewees were either top managers or project managers who were supposed to be the most knowledgeable about the innovation strategy, the OI strategy and the past and ongoing OI projects in their firms. Information on the respondents is presented in the table in Appendix (Appendix A). A deductive research approach was adopted, and semi-structured interviews were conducted through developing an interview guide based on the theoretical framework and previous research findings. The interview started with a clear focus on the innovation strategy in the introduction. Then, respondents were asked to focus their attention on OI projects. An important part of the interview was dedicated to the project descriptions, where interviewees were asked to explain the OI practices and sub-practices they utilized and defend their choices. In addition, the secondary data concerning OI projects was made available by firms. These in-depth interviews were crucial to identifying and better understanding the contextual factors that influenced the choices OI practices. Thus, the selected innovation project was defined as the unit of analysis (Miles and Huberman, 2003). In addition, various types of documentation related to the OI projects (e.g., letters, progress reports, other personal or administrative documents) and archival records (e.g., reports on sales, survey data, customer feedback) were included in the empirical data.

In this study, the data was analyzed from a triangulation perspective to improve the construct validity; multiple sources of evidence provide multiple measurements of the same phenomenon (Yin, 2009) and can indicate that independent measures of this phenomenon are consistent and not contradictory (Miles and Huberman, 2003). The first step of the data analysis involved conducting a structural content analysis (Rothkopf, 2009).

To systematize the data analysis, a coding scheme was developed. This way to analyze data is often considered as a criterion of reliability and validity. We applied a

deductive procedure to develop the categories. The categories have been defined before the data collection based on the theoretical framework of the research. However, the procedure was iterative, some codes have been modified or sub-categories were added based on the collected data. A multi-stage categorization and coding process was used in this study at different level as suggested and applied by Rothkopf (2009). Firstly all the text passages from the set of documents having a link with the themes have been highlighted. Next, the text passages, words or sentences fitting the indicators and dimensions from the coding scheme (Rothkopf, 2009) were coded. After a first coding, the codes have been reviewed a first time. Next, a computerized method of qualitative data analysis has been used. Among the softwares available on the market, Atlas.ti (V4.2). Once a stable coding scheme was obtained, the codes have been categorized to reduce the amount of codes and facilitate the analysis.

A within-case analysis and a cross-case analysis were performed to reveal the similarities and differences between the cases and to derive patterns (Eisenhardt, 1989; Rothkopf 2009). A display of the data was constructed to allow users to draw valid conclusions from these data (Voss et al., 2002). Two matrices were built to describe the cases that were examined in this study. The first matrix presents each firm's "identity card". The second matrix describes the innovation project of interest, the actors that were integrated into this project, and the OI practice that was implemented with each actor, including the underlying reasons. Finally, a standardized table was created for each case.

Several measures were taken to ensure greater validity and reliability within this study. Construct validity has been improved by using multiple sources of data and by obtaining a review from each corresponding study respondent (Yin, 2009). Internal validity was improved by focusing on data creditability. We actively involved the respondents in reviewing our results and thus reduced the likelihood of misunderstanding (Yin, 2009). Addressing external validity (generalizability) is challenging with a case study approach. However, the primary aim was to obtain analytical generalizability (i.e., generalizability from empirical observations to theory rather than extension to a population). Therefore, we did not attempt to generalize the results beyond the sample under investigation. Finally, to further increase reliability and thus enhance transparency and the likelihood of replication, we constructed a case study protocol and a case study database. This database included case study notes, documents, and analysis (Yin, 2009).

4. Results

4.1. OI practices

Our results reveal that the services SMEs in our sample primarily integrate external resources for internal development. More specifically, we identified four prevalent modes of inbound OI in our case companies.

Public organization and university collaboration: According to a respondent from case company 2, "Two universities are close to us. They performed R&D for us (…) we simply used a contract with them for R&D outputs". They said that because universities can be specialized knowledge holders with no interest in competing with SMEs, it was typically easy to establish and maintain relationships with them. Case company 1 utilized another mode of collaborating with experts in a university. They explained, "It was simply a funded project at the University; the PhD received a grant". In certain cases, it was also possible to utilize public organizations as facilitators for establishing collaboration with a university. A respondent from case

company 7 shares, “They accompany us permanently (…) They get us in touch with the University (…) During the entire project they followed us (…) Even when we didn't need them (…) They help us to build the demand for the DGO6 and to meet them...".A respondent from case company 1 also explains, “Our project has been accepted for funding by the state, but they followed us during the entire process.”

In-licensing technologies: To drive innovation outputs, SMEs also explored a well-known mode of technology and knowledge integration, which relates to in-licensing resources. The basic idea for most case companies was to gain access to knowledge/knowhow, which is not possible to develop internally due to lack of time, resources or competence. A respondent from case company 5 explains, “The supplier had the patent for an element we needed, and thus, their knowhow was in-licensed”. In certain cases, SMEs’ networks were used to scout for technology that was necessary for innovation. A respondent from case company 8 explains, “The first supplier told us that we would need this type of supplier, and they proposed that we use this supplier that is one of their partners.” Formal procedures for in-licensing technologies were identified within the case companies. For example, a respondent from case company 16 stated, “The supplier has been selected based on a call for tender (…) he was selected and supplied the equipment to operationalize the technology.”

Co-development with customers: Customer involvement was found to be widely prioritized in in-bound OI practice. Several market intelligence approaches were employed to capture customer needs early in the innovation process. Case company 3 explains, “We ask them (particular customers); we call them and we ask them their opinions; we ask them to send us their comments, the problems they faced (…)". Similarly, a respondent from case company 8 shares, “The aim was to discuss with them to know what they want, what interested them (…). (After the meeting) we knew what they wanted, what we should integrate in our offer”. Respondent from case company 13 explains, “The customer that proposed to us this idea, he was integrated during the entire project to give us feedback (…)”. In addition to capturing the needs and expectations of customers, our case companies also conducted activities that elicited regular feedback during different stages of development. They argued that early and regular testing and validation were practices for reducing the risk of developing a misfit service or process. A respondent from case company 15 explains, “Customers simply tested the service for free and gave us feedback. We made some changes, and then, they tested the service again (…).

Informal and formal networking: Utilizing network relationships was a central practice for our case companies. It enabled them to expand the scope of technologies and knowledge, which can be integrated in the early innovation process. Two forms of networking were found during our analysis. Certain SMEs preferred to work in a more informal network structure. A case company 17 respondent explains, “Our external network partners (especially other SMEs) needs us, and we need them (…) It was an open collaboration, similar to the case with the University”. In other cases, more formalized structures were used. A case company 16 respondent states, “We (the company and 3 competitors) made a joint development project, and each partner brings its own expertise, as mentioned in the contract”. Similarly, a respondent from case company 9 states, "They deliver the software (…) we also signed a collaboration contract where we co-developed something".

In contrast to inbound OI, none of the eighteen OI projects in this study considered the implementation of outbound practices. The respondents explained that they implemented OI practices “(…) *because we do not have enough resources internally to achieve interesting innovation projects* (…)”. In the current context, the firms were unable to generate competitive ideas and/or technologies because “(…) *there are more ideas in a region than in our company, so we can profit from ideas that exist*

outside our company". However, the service SMEs in our sample did not perceive that they would be likely to benefit from outbound practices. Generally, outbound practices were considered risky and complex: "(…) *if I share our ideas or technologies with the world, what will be the benefit for my company*?" and "(…) *how can I manage this type of relationship? I have to maintain control of information sharing* (…)".

The data revealed that certain factors influenced the firms' decisions to engage primarily in in-bound OI rather than outbound OI. These factors are associated with firm size, industrial setting, and knowledge intensity.

Firm size: A common reason for the decisions of all our case companies was related to their size, which limited their scope to invest in outbound-oriented practices. A respondent from case company 5 explains, "We know it is a possibility, but, well, it is maybe more complex than what we currently do… You know, we are a very small structure, and we do not have any time or money to engage in the learning process and this … well, in this form of collaboration, it requires a lot". Respondents from 4 case firms also validated the limitations due to firm size: "Well, OI is interesting, but is it still beneficial for us if it requires investment; and when I say 'investment', that is financial but it also means time, resources (…) That is my opinion, and it could explain why we mainly use external technology: It is easier". "We spend a lot of money (regarding the number of people working for us) on innovation, so I will not reveal the information or the resources outside the company (…) I think that large companies can do that because they have structures, they can engage lawyers, but in our case, it is impossible". Certain respondents also expressed concerns about losing control over their technologies through outbound OI practices. For example, "We fear losing control over what we develop, and I don't see how we could see the benefit of such a practice (…) you know, we are not … I mean, we don't have a legal department as do large companies, and we do not have any procedure to, for example, capture the benefit that could be generated by this type of practice (...)." In other cases, size inhibits case firms from experimenting with outbound practices because they did not fit will with their strategic orientation. One respondent from case company 5 explains, "We sell our development (…) our small company cannot develop something and let it sleep (…) when we develop something, we need to commercialize it to our market quickly". Moreover, managing and evaluating the value of technology or know-how is a challenge for case companies. "It's too complicated for us (…) we cannot manage such activities in a very small company."

Industrial setting: Respondents highlighted that the industrial conditions inherent to services compared to products create challenges for SMEs to enforce knowledge protection. According to a respondent from case company 8, "It is very simple. In our sector, we have limited protection, or it is very difficult. So, if we implement outbound practices, will there be additional risks for us?" Several respondents also questioned the possibility of taking advantage of their internal knowhow through outbound practices. "The activity you mentioned (outbound) is also more relevant for companies that produce goods (…) these companies can better protect their innovations than we can". Another respondent added, "If there is a way to protect a service as goods are protected, I may try, but for now, it is not possible (…) well, that's my opinion". Other respondents questioned the possibility of capturing value through selling their knowhow without hampering their competitiveness in existing markets. One respondent explains, "Well, thinking about outbound, I foresee that when we have an idea, we want to develop it ourselves, or at least in cooperation to get the benefit from it (…) and if we invest in development and then we sell to other companies or organizations, it is too risky because it is very difficult to capture value of these developments ... but I think it is very specific to our sector of activity and to the fact that I manage a small company".

Knowledge intensity: With rapid changes in technology and the high demand for companies to operate in a high-tech industry, most case companies preferred to explore inbound OI rather than outbound. One respondent explains, "We prefer collaboration with external partners. The main objective is to get access to their resources, knowledge, information—and what you are speaking about does not allow us to reach this objective. In our sector (IT consulting), we need a lot of knowledge and information to achieve an innovation project (...)". Due to increased knowledge intensity, the respondents' view was that outbound OI practices were limited for them. "We are interested in external knowledge, but we don't want to share ours with others." Another respondent adds, "Simply because we want to get access to others' resources and not really to share ours (…) It is too risky (…) and people will not share more information or knowledge that could be interesting for my company because I share my ideas or development."

4.2. OI sub-practices

The ways in which service SMEs practice inbound OI were then observed. These firms appear to practice the two processes linked to inbound practices: acquiring ("*In this case, we collaborated by using a well-defined contract involving agreements concerning the terms of trade,"*) and sourcing (" (…) *by discussing with a potential partner (at this time), we discover that it was possible to work together in a less formal way as each one borrows something crucial for the innovation project*"). We found that the process of acquiring was practiced in the majority of cases (17 of 18 projects), whereas sourcing was practiced in only half of the projects.

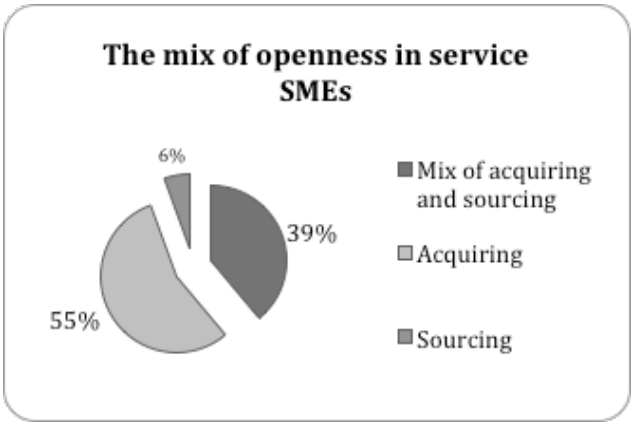

Fig. 1. The mix of openness in service SMEs

To classify a firm's OI activities between sourcing and acquiring, we focused on the degree of formality of the collaboration (using a contract, setting a price) and the extent to which the firm had the freedom to access, add and modify the external resources, as suggested by Wikhamn (2013). For example, case company 6 collaborated with a company from another sector, and the manager said, "*We share our knowledge and our resources without limitation because we need each other to achieve the project (…) Our collaboration was totally transparent; both partners had the possibility to freely use the resources provided by the other*". The manager of case company 17 mentioned, "We collaborate with this association, and because we needed each other, we were able to collaborate without limitations or a contract to control each other (…) they provided us information and feedback on the service (…) they always have access to the information regarding the project (…) finally, they

have the opportunity to use it without any restriction". These collaborations were classified as sourcing practices. On the contrary, the manager in the first case company said, "With the university, it was formal (…) we present our need and they develop the interface (…) we never get access to the source code and access to their knowledge was limited to the use of the interface". Case company 7 has also adopted acquiring strategies with a supplier: "We need access to their patent (…) we only get the right to use the technology. If modifications were required, these modifications had to be performed by their care (…) our use of their technology was limited and contractual".

More specifically, we identified three reasons why case companies were inclined to engage in acquisition instead of sourcing sub-practices.

Types of external relationship: We found that across different types of external partnerships, SMEs preferred to work in a formal rather than an informal arrangement. A respondent explains the relational conditions when they acquire knowledge from supplier: "It is a standard (…) we never think to work differently. It is easier and less risky when everything is anticipated in a contract. It prevents managerial problems, and when there is a problem, we know how to solve it". Other respondents' sourcing conditions were similar: "We always work like that with our suppliers. We also prefer this situation because it prevents a situation in which they want to be too involved in the project (...) they could get information that we wanted to keep for ourselves and use it on another project. Well, in an unfair way." We also found a similar perception of engaging in inbound OI practices with other partners, such as competitors and external consultants. For example, a respondent from case company 8 explained, "We use formal practices simply because there still exists a risk… they are our competitors, so even if we work together-and we work hardly together on an entire project-we cannot take any risks (...)". With regard to consultants, a respondent stated, "They propose a service. They are generally specialized in a preview, and to get access to this service, we have to pay and sign a contract. I don't see other explanations. It is not a question of risk management, like some cases, because consultants are, I think, very reliable". Thus, the above examples depict the concern shared by case companies. Regardless of the types of external relationships, respondents preferred acquisition practice.

Firm vulnerability: SME respondents did not rule out the likelihood of sourcing but explained that acquisition provided them with a lower possibility to be vulnerable to opportunistic behavior. For example, statements like "Why would we use a contract? Simply to avoid a situation in which our partner chose to use information on another project or take information to leave the project." Another respondent shared a more resource-driven reasoning: "We are a small company with limited resources. Contracting is the only way to avoid traitors." Similarly, "by anticipating potential problems and how to solve them in the contract, it partly protects us (…) Our small company cannot invest in a project and take the risk of never getting the financial benefits because the partner is an opportunist (…) I know that there is still a risk, but by knowing the potential sanctions, he could think twice before acting as an opportunist." Thus, generally, the case companies (i.e., SMEs) had a reserved internal view on their ability to manage informal relationships due to limited resources.

Lack of relational skills and competences: We found that to be able to manage formal and informal relationships required the development of relational skills and competencies. This presents a challenge for case companies; one respondent explains, "Maybe large companies that have a lot of departments with managers with lots of skills can practice OI in another way than we are doing it, but in our case, I cannot really imagine…" Therefore, reliance on contracts and formal structures was viewed as compensating for a lack of relationship management ability. One respondent states, "The contract is just there to keep control of the relationship, to avoid having a

partner become too important (…) we have to stay focused on the innovation project and our objective." Another respondent suggested that if contracts were not used to manage relationships, a high level of trust needed to be established. "I think that to collaborate without a contract, there is a need for high trust, and it costs a lot of time and resources and thus a financial investment to build a strong relationship with our partner."

Perceived complementarities: We found that when case companies collaborated in projects where both parties complemented each other's knowhow, it was easier to perform a task in a sourcing mode. A respondent explains, "With such partners, it was possible to work without a contract because we were sure that they needed us to realize the project. There are perhaps one or two companies that could help them, but they could never reach the level of quality that we reached…It is also a protection." Complementarity between partners provided a safety net to both actors because they needed each other to complete the project and reach the common goal. "They had the technology, but they didn't have the knowledge. We had the knowledge, but we didn't have the technology. It was impossible to work alone to achieve the innovation." Similarly, another respondent suggested, "We can use an informal way to collaborate, but we have to be sure that our partners need us at least as much as we need them to achieve the new services…" However, such specialized relationship conditions for inbound OI practice were not largely common for our case companies.

5. Discussion

OI is widely recognized as the next-generation innovation model for firms and a viable approach to secure a future competitive advantage. However, the examination of OI practices and sub-practices in the service industry is a largely understudied research area. Most prior studies have predominantly focused on manufacturing firms (Evangelista and Savona, 2010; Trigo and Vence, 2012; Parida et al., 2014). We argue that service firms are different with regard to OI adoption because of their service-related characteristics and underlining organizational structures, such as intangibility and close customer involvement. Therefore, to further advance our understanding of service firms' adoption of an open perspective of innovation, we address two key questions. First, how do service firms adopt OI practices and sub-practices? Second, what are the factors that influence the selection and adoption of OI practices and sub-practices? Figure 2 provides an illustrative explanation of relationship between OI practices, sub-practices and respective contextual factors.

Our results revealed that service SMEs primarily adopt inbound practices rather than outbound practices. This would imply that like manufacturing firms (ven der Meer, 2007), service firms are also inclined to use inbound OI practices. However, the underlining reasons for such selection may be different for service firms. We argue that underlying characteristics associated with offering services may partially explain such preferences. For example, due to intangibility, services are difficult to formally protect, whereas outbound practice is generally associated with the use of patents (Harhoff et al., 2003). Similarly, heterogeneity also makes it more difficult to deliver exactly the same service value, which makes it challenging to go outbound through creating spin-offs or selling to other firms (Wilson et al., 2008; Dahlander and Gann, 2010). The need is also higher to be customer-centric for service innovation (Johnsens et al., 2006), which makes it challenging for service firms to engage in outbound OI practices. Service offering and service innovation are much more complex because they require interaction with customers and, sometimes, multiple network actors (Chae, 2011). Consequently, firms that operate in such an environment seem to prefer a 'formal' (or controlled) process to an informal (or 'libre') process. Finally, service

firms are less likely to invest in R&D (Alic 2001), whereas outbound OI is generally adopted by companies to take advantage of un- or underexploited internal development(Chesbrough 2006).

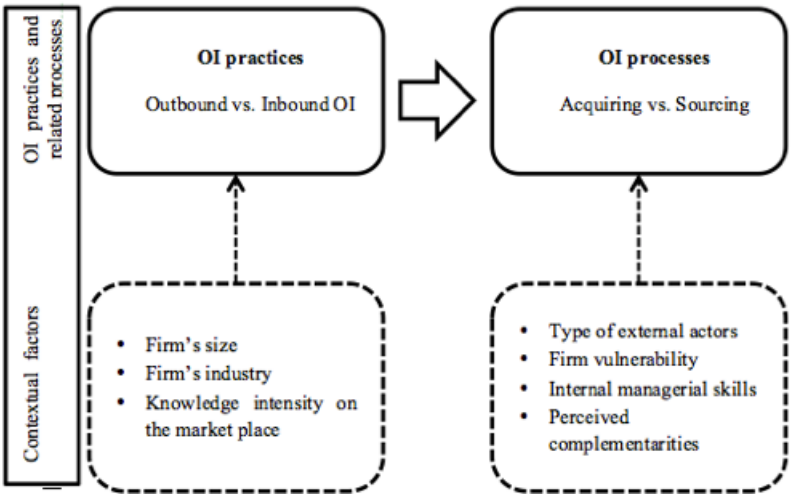

Fig. 2. Factors influencing the practices and sub-practices implemented by services SMEs

With regard to inbound OI practices, we find evidence for both sourcing and acquiring sub-practices. We found examples related to university search grants, contracted R&D, in-licensing, formal joint development and financed projects to be prevalent acquiring activities for service firms. Similarly, our case firms were also engaged in informal networking, customer co-creation and co-development, and public organizational funding as sourcing activities. On a more detailed level, we find that only a low number of our case firms found sourcing to be relevant for driving innovation, whereas the majority opted for acquiring processes. However, a reasonable number of case firms preferred a mixed approach for OI processes. These results highlight the importance of acquiring and sourcing external inputs for service SMEs. Thus, our results build on limited prior studies that have attempted to better understand the OI practices and sub-practices of SMEs (Laursen and Salter, 2006; van de Vrande et al., 2009; Parida et al., 2012).

In addition, we identified three contextual influences on our case firms' decisions to engage in inbound OI practices. These factors are related to firm size, firm industry and knowledge intensity on the market. Firm size, to a large extent, represents the availability of resources, which is generally limited in case of small service firms. This would imply that small service firms could engage in selective OI practices and may find it more beneficial to access external resources through inbound practices (e.g., networking) than more complex and resources-intensive outbound practices. For example, outbound OI requires financial resources for the implementation of a structured procedure for the identification of alternative technology applications. These activities involve complex coordination and high levels of managerial resources (Narula, 2004; van de Vrande et al., 2006; Bianchi et al., 2010). Thus, firm size partially explains why outbound practices are more frequently employed by larger firms than by smaller firms (Narula, 2004). Second, we agree with prior studies that suggest that a firm industry influences OI practice adoption (Chesbrough and Crowther, 2006). For example, manufacturing firms are more likely to practice R&D outsourcing and IP out-licensing relative to firms from another industry (van de Vrande et al., 2006). Outbound practices are often compared to the use of patents

(Harhoff et al., 2003). We find that service SMEs are less likely to be interested in such OI practices. Moreover, some outbound practices are associated with a risk of deviant behavior, and the difficulty in protecting their innovations often explains why service firms consider outbound OI to be a risky undertaking (Rubalcaba et al., 2010). Transaction costs can be another obstacle to the practice of outbound processes, according to (Dahlander and Gann, 2010). These costs may be higher because of the intangible and heterogeneous nature of services. In other studies, (Tether, 2002) and (Salavisa et al., 2012) have suggested that there are differences between service firms in different sub-industries. However, in the present study, no differences between high-tech and knowledge-intensive service industries were identified. Finally, consistent with previous research, the present study found that knowledge intensity is another factor that may explain a company's choice to use inbound OI (Gassmann and Enkel, 2004). This factor could also partially explain the contradictory results that have been revealed regarding the influence of technology intensity. It has been observed that technology intensity may affect the implementation of OI in firms (Miotti and Sachwald, 2003). In particular, firms in high-tech industries have been found to engage more frequently in integrating external resources through OI. In contrast, the results of Gassmann and Enkel (2004) suggested that firms that practice inbound OI are typically firms from low-tech industries that seek to acquire technologies complementary to their current capabilities. All of the firms that participated in the current study are active in an industry that requires a high level of knowledge (which may be combined with technology). Therefore, these firms may resort to inbound OI because their internal knowledge may not always be sufficient to meet their innovation needs (Gassmann and Enkel, 2004). Thus, the above three contextual factors largely explain the inclination towards inbound OI practices.

Further analysis reveals additional contextual factors that influence the decision to select and implement OI sub-practices associated with acquiring and sourcing. First, the type of external actor involved, such as suppliers, competitors, consultants, and public business promotion programs, may influence the company's choice between OI sub-practices. We find that acquiring may be practiced to limit the involvement of external actors or to provide protection against potential opportunistic behavior because risk and trust are two components of decision-making (Josang and Lo Presti, 2004). Alternatively, acquiring may simply be linked to a collaborator's market position. Sourcing is generally practiced among organizations that are linked to public services because the inherently low risk associated with this type of actor generally promotes collaboration between different organizations (Parida et al., 2014). There appears to be no consistent pattern with respect to the chosen OI processes that involve customers, other firms, and universities. The second factor that we identified was the vulnerability of firms. Compared with larger firms, SMEs are more vulnerable to opportunistic behavior[1](Nooteboom 1993; Dickson et al., 2006). The risk of opportunistic behavior motivates firms to allocate funds and resources to control and monitoring activities, even when such resources could have been allocated more efficiently (Wathne and Heide, 2000). This phenomenon thus explains SMEs' frequent use of the more formal OI sub-practice of acquiring. However, it has

[1] Opportunistic behavior is generally defined as "self-interest seeking with guile" (Williamson, 1985). Two types of opportunistic behavior have been identified by Bass and Avolio (1997): the voluntary hiding of various information during the initialization of a relationship and different types of violations that may occur during the relationship (Wathne and Heide, 2000). The vulnerability of SMEs to opportunistic behavior is based on the assumption that larger firms have more transaction actors and are thus less sensitive to opportunistic behavior from any of these actors (Nooteboom, 1993)

been suggested that an "excessive" use of contracts can have a negative effect on a firm's innovative performance because such heavy contract use leads to lower levels of flexibility (Wang et al., 2011). Third, the managerial skill deficiencies are also important factors for service SMEs: These deficiencies lead service SMEs to use acquiring processes to address the risk of opportunistic behavior. Indeed, Wathne and Heide (2000) presented solutions[2] for the risk of opportunistic behavior. However, because SMEs lack managerial skills, these firms may have trouble implementing these practices. Thus, the use of formal agreements may appear to be the only solution for facilitating innovative collaboration. Finally, the extant complementarities between an SME and external actors have been identified as influencing acquiring or sourcing decisions. Resource complementarity has been emphasized as a factor that exerts a positive influence on reciprocal commitment (Sarkar et al., 2001). Although perceived complementarity may not have a direct effect on trust (Sarkar et al., 2001), this perception may indirectly affect trust by making the actors in a collaboration aware of their mutual interests. Indeed, perceived complementarity has been identified as a factor that affects the choice between formal and informal modes of cooperation (Hakansson and Johanson, 2002). In the absence of perceived complementarities, such companies will choose to practice acquiring. If actors perceive their resources as complementary in nature, then sourcing (which is a less formal OI practice compared with acquiring) can be adopted because this OI practice increases reciprocal commitment and because SMEs will not regard the use of a contract as a necessity.

Taken together, understanding of OI practices, sub-practices and contextual factors provides insights towards routines (Enkel et al., 2010) and capability-based view (Helfat and Peteraf, 2003; Enkel, Gassmann et al., 2009)). Adoption of OI by service SMEs follows a specific approach where certain routines more preferred and feasible to secure future innovative competitiveness. Moreover, selection of inbound OI and diverse sub-practices largely depends upon several identified contextual factors. These factors influence the extent to which service firms can benefit from adaptation of OI. Though taking a holistic perspective towards OI adaption for service firms, we can better explain which practices or routines firms should strive to develop in order to open their innovation process. If successful, OI practices and sub-practices can act as microfoundations for development of dynamic capability (Teece et al., 1997), which would provide necessary flexibility to cope with changing market environment. Thus, we argue that our study holds theoretical implications towards capability literature, which have not been widely understood in relation to open service innovation.

6. Practical implication, limitation and suggestions for future studies

These results also have implications for CEOs and innovation managers in service SMEs. We argue that managers need to better understand the complexities associated with selecting and adopting OI practices and processes. The results of this study indicate that different OI processes are chosen within different contexts. This knowledge could help managers to determine whether they should practice outbound OI, inbound OI, or a mixture of both types of OI. Moreover, based on our analytical

[2] These solutions include monitoring, the use of incentives, the appropriate selection of actors, and socialization.

results, a manager could consider whether to engage in acquiring or sourcing based on the full understanding of the firm's specific needs. We would suggest that depending upon contextual factors such as the type of external actors, the level of vulnerability, the managerial skills and the possibilities for complementarity, they should choose acquiring or sourcing processes.

This study offers a significant contribution to OI research. However, as with all studies, the results must be interpreted with consideration of certain limitations. First, this research investigated eighteen service SMEs from knowledge-intensive and high-tech service industries. Thus, we make no claims regarding the generalizability of our findings; rather, we have focused on advancing a deeper understanding of OI adoption in service firms. Moreover, we may observe variations in the results in the context of less knowledge-intensive service industries, such as financial services. Therefore, future research may emphasize the potential similarities and differences between various service industries with respect to OI adoption.

Second, the framework that was used in our study to classify OI practices and sub-practices was based on the recent study by (Dahlander and Gann 2010), who recognized two OI practices and four associated sub-practices based on an extensive literature study. This framework can be further expanded through the addition of new dimensions for deepening our understanding of OI adoption.

Given that firms evolve and can become more engaged in OI practices (van de Vrande, de Jong et al. 2006), the OI paradigm may become the rule rather than the exception. Thus, it could be interesting to investigate how the choice of OI practices and sub-practices evolves among the service firms. In fact, as OI practices become better known, documented, and common, SMEs could choose outbound OI in more extensive ways. Thus, longitudinal studies are required to further advance our understanding of the under-researched topic of open service innovation.

This study emphasized that service SMEs do not choose the processes of revealing and selling (which are both outbound OI practices). Further investigations should identify the situations in which service SMEs could select these two OI processes, which have been shown to result in revenue generation.

Finally, a large-scale quantitative examination of service SMEs should be performed to confirm the qualitative findings of the current study. This type of research could confirm the results and provide insights for explaining some contradictory results, such as the "non-influence" of the project type and project novelty on the choice of innovation processes and practices.

7. Conclusion

In conclusion, we contribute to emerging OI literature and capability literature by providing insights into the way service firms can implement practices and sub-practices to use external resources for innovation. Our results show that service firms are inclined to prefer to use external resources for internal development rather than sharing internal resources externally. Based on in-depth analysis, we also found indications for several contextual factors that largely explain the tendency to engage in certain 'controlled' and/or 'libre' sub-practices. Thus, we encourage innovation management researchers that are interested to advancing OI literature to further pursue the topic of open service innovation.

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Appendix

Appendix A: Sample description

Case No	Service sector	Firm size	Interviewee position	Degree of novelty	Innovation type
1	High-tech, knowledge-intensive services	Small	Founder	Incremental innovation	Service innovation
2	High-tech, knowledge-intensive services	Small	Founder	Radical innovation	Process innovation
3	High-tech, knowledge-intensive services	Small	Managing director	Radical innovation	Service innovation
4	High-tech, knowledge-intensive services	Small	Technical director	Radical innovation	Process Innovation
5	Knowledge-intensive market services (excluding high-tech and financial services)	Small	Manager	Radical innovation	Process Innovation
6	High-tech, knowledge-intensive services	Micro	Manager	Radical innovation	Service innovation
7	High-tech, knowledge-intensive services	Small	CEO	Radical innovation	Service innovation
8	High-tech, knowledge-intensive services	Medium	CEO	Radical innovation	Process Innovation
9	Knowledge-intensive market services (excluding high-tech and financial services)	Small	Director	Incremental innovation	Service Innovation
10	High-tech, knowledge-intensive services	Small	Manager	Incremental innovation	Process Innovation
11	High-tech, knowledge-intensive services	Micro	Founder	Incremental innovation	Service innovation
12	Knowledge-intensive market services (excluding high-tech and financial services)	Small	Manager	Incremental innovation	Service innovation
13	High-tech, knowledge-intensive services	Small	Business Manager	Radical innovation	Service innovation
14	High-tech,knowledge-intensive services	Micro	Founder	Radical innovation	Service innovation
15	High-tech,knowledge-intensive services	Small	IT manager	Incremental innovation	Service Innovation
16	High-tech, knowledge-intensive services	Small	Manager	Radical innovation	Process Innovation
17	High-tech, knowledge-intensive services	Medium	Innovation Manager	Radical innovation	Process innovation
18	High-tech, knowledge-intensive services	Small	Founder	Incremental innovation	Service innovation