Key challenges and opportunities of service innovation processes in technology supplier-service provider partnerships

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ABSTRACT

Business-to-business (B2B) technology suppliers have the potential to contribute to the service innovation process in distinct ways. Because they work with multiple service providers, they can identify emerging market trends and technological requirements. However, they face different challenges and opportunities throughout their partnership in the service innovation process. This study contributes to the B2B service innovation literature by uncovering challenges and opportunities that technology suppliers face during the service innovation process and their partnership with service providers. We identify five groups of challenges/opportunities: (1) B2B partners' level of knowledge, (2) B2B partners' involvement in the back/front end, (3) B2B partners' market approach, (4) the impact of B2B partners' organizational processes, and (5) B2B partners' business interactions. We develop a managerially distinct service innovation process typology that identifies different roles and characteristics of B2B partners. It further identifies the extent to which the service innovation process can be outcome- and process-based.

Keywords:
technology supplier
service provider
service innovation process
B2B partnership
new technologies

1. Introduction

Business-to-business (B2B) technology suppliers are strategically important partners of service providers in delivering innovative, technology-driven business solutions (Hidalgo & D'Alvano, 2014; Markovic et al., 2020). To keep up with the growing and changing needs of business customers in collaborative B2B contexts, service providers are required to incorporate technology into their service innovation processes (Biemans & Griffin, 2018; Storey et al., 2016). Given the increasing complexity of service innovation processes, service providers rely heavily on external sources of technological innovation (i.e., different B2B partners) to increase the chances of both outcome- and process-based innovation success (Gallouj & Savona, 2009; Helkkula et al., 2018; Witell et al., 2017). Thus, service providers are increasingly collaborating with external technology suppliers throughout the service innovation processes rather than relying solely on their internal resources (Biemans et al., 2016; Helkkula et al., 2018).

Given the proximity of technology suppliers to B2B customers, they are usually the first to identify customers' needs (Miozzo & Soete, 2001). They also engage in B2B collaborations with multiple service providers, which, compared with a service provider's internal development team, allows them to gain deeper insights into new trends, customer needs, technological innovations, and particular requirements of the service innovation process (Frambach et al., 1998; Gallouj & Savona, 2009; Helkkula et al., 2018). As such, service providers are better off when they can leverage these insights via partnerships with technology suppliers throughout the service innovation processes. For example, as a leading management consultant, Bain & Company begins its partnerships with technology suppliers on more transactional terms to develop comprehensive service offerings such as IP-enabled transformation roadmaps for improving effectiveness and agile operating systems for

increasing efficiency and productivity among the workforce (Hill, 2019). To move beyond transactional conditions and toward relational partnerships, Bain's technology suppliers design exclusive IT platforms, which helps the company quickly innovate its services in response to the latest market trends. The technology suppliers also offer exclusive training and prioritize the supply of technologies to Bain through their partnership in the service innovation process.

Despite the vital positioning of technology suppliers in the service innovation process, their roles and partnership with service providers are overlooked and often assumed to be identical to the role of the internal development team (Biemans & Griffin, 2018; Hidalgo & Herrera, 2020). This assumption impedes our understanding of technology suppliers and their B2B partnerships with service providers in the service innovation process. Although technology suppliers are strong drivers of technological innovations and affect the outcome and process of service innovation (Helkkula et al., 2018; Miozzo & Soete, 2001), the prerequisites and conditions under which they engage in partnerships with service providers in the service innovation process are not well understood in the B2B service innovation literature (Hidalgo & Herrera, 2020). Pertinent literature does not fully account for the vital partnership and challenges of technology suppliers in the service innovation process, focusing instead primarily on service providers' challenges in innovating services (Biemans & Griffin, 2018; Storey et al., 2016). As such, several gaps in the literature persist.

First, in a B2B environment, when the service provider partners with one or more technology suppliers, the success of the service provider depends on the technology supplier's capabilities as a source of technological innovation (Gallouj et al., 2015; Miozzo & Soete, 2001). However, limited studies capture the partnership of B2B members, particularly the interactions between technology suppliers and service providers in the service innovation process. An enduring issue that service providers face is to identify key challenges that impact the service innovation process as a result of B2B partnerships with key suppliers and the

introduction of new technologies (Biemans & Griffin, 2018; Hidalgo & Herrera, 2020). These challenges can also determine the extent to which the service innovation process can be outcome-based or process-based (Helkkula et al., 2018; Witell et al., 2017).

Second, extant studies hold technology suppliers responsible not only for training the internal development team but also for providing maintenance and offering external support throughout the B2B partnership (Gallouj & Savona, 2009; Hidalgo & D'Alvano, 2014; Miozzo & Soete, 2001). However, technology suppliers, similar to service providers, face many challenges throughout the service innovation process (Frambach et al., 1998; Gallouj & Savona, 2009). Despite the growing recognition of supplier innovations and their impact on the service innovation process (Helkkula et al., 2018; Hidalgo & D'Alvano, 2014), we have a limited understanding of the primary challenges and opportunities that technology suppliers face as a result of their B2B partnerships with service providers in the service innovation process (Biemans & Griffin, 2018; Hidalgo & Herrera, 2020).

Identifying such challenges can determine a technology supplier's readiness, and to some extent the service provider's as a key B2B partner, which impacts the competitive capabilities and ultimate success of the service innovation process. We contribute to the B2B service innovation literature by exploring the following research question: What are the challenges and opportunities inherent to the service innovation process in a technology supplier–service provider partnership?

To answer this research question, we draw on multiple case studies of B2B partnerships between technology suppliers and service providers from a cross-section of the U.K. service sector. Each case represents a particular type of technology, which is introduced and applied to the service innovation process. This research makes at least two contributions. First, by empirically examining challenges and opportunities from the technology supplier perspective, we find that technology suppliers, like service providers, can initiate and influence the success

or failure of the service innovation process. In a B2B partnership, throughout the service innovation process, technology suppliers encounter myriad challenges, as well as some opportunities, that differ from those faced by internal development teams. We explore these challenges using extant B2B service innovation literature as our sensitizing concept. We formulate a categorization of challenges and potential opportunities in the service innovation process. These include (1) B2B partners' level of knowledge, (2) B2B partners' involvement in the back or front end, (3) B2B partners' market approach, (4) the impact of B2B partners' organizational processes, and (5) B2B partners' level of business interactions.

Second, building on our categorization of challenges and potential opportunities, and drawing on extant B2B service innovation literature, we propose a service innovation process typology. The typology highlights the different roles of technology suppliers and service providers in B2B partnerships throughout the service innovation process. It offers both practical and theoretical insights, as it shows how different states of challenge and potential opportunity result in different roles and different sets of activities. The typology also shows the extent to which the service innovation process can be outcome-based and process-based.

The paper proceeds as follows: In Section 2, we review the literature on B2B service innovation. We highlight the importance of B2B partnerships between technology suppliers and service providers, emerging challenges and opportunities, and the introduction of new technologies alongside their resulting impacts. In Section 3, we explain our method of data collection, and in Section 4, we present our findings. In Section 5, we present our typology. Finally, in Section 6, we discuss the theoretical contributions, managerial implications, limitations, and directions for future studies.

2. Theoretical background

2.1. B2B partnerships in the service innovation process: the technology supplier and the service provider

In the last decade, there has been an increasing focus on the importance of the B2B service innovation process, combined with how B2B partners benefit from the application of technologies across a wide range of sectors, including retail, finance, healthcare, and insurance (Biemans & Griffin, 2018; Hidalgo & Herrera, 2020; Ostrom et al., 2015; Snyder et al., 2016). Given the rapidity of technological change and the variety of technologies required to impact both outcomes and processes in service innovation, there is a growing tendency toward both short-term and long-term B2B partnerships between service providers and external technology suppliers (Helkkula et al., 2018; Kowalkowski et al., 2017; Kowalkowski & Ulaga, 2017; Miozzo & Soete, 2001).

Indeed, technology suppliers have long been key contributors to the outcomes and processes of service innovation, while acting as the key to unlocking new sources of competitive advantage (Agarwal et al., 2015; Witell et al., 2017). In complex and quickly changing market conditions, as is the case in the service sector, technology suppliers collaborate with different service providers through their network relationships (Hidalgo & Herrera, 2020; Sirilli & Evangelista, 1998). Doing so enables them to gain vital knowledge about the latest market trends and emerging customer demands across the sector (Miozzo & Soete, 2001). Technology suppliers can then use this knowledge and contribute to different processes and outcomes of service innovation in collaboration with different B2B customers (Helkkula et al., 2018; Hidalgo & D'Alvano, 2014). They can also contribute to the process and outcome of service innovation by improving technological equipment, information, and materials (Hidalgo & D'Alvano, 2014; Miozzo & Soete, 2001).

It is not surprising that service providers rely on technology suppliers as a key resource for technological diversification and understanding key requirements of the service innovation process (Hidalgo & D'Alvano, 2014; Hidalgo & Herrera, 2020; Kowalkowski & Ulaga, 2017). However, the way technology suppliers benefit from the outcome and process of service innovation varies considerably due to their scale, their level of technological advancement, and the nature of their partnership (i.e., whether they are in transactional or relational terms with their B2B clients) (Chang et al., 2012; Gallouj & Savona, 2009; Miozzo & Soete, 2001). Indeed, the extent of collaboration between technology suppliers and service providers—that is, whether they are in transactional or relational terms—determines the extent to which they can stimulate innovative activities in the service innovation process (Agarwal et al., 2015; Hidalgo & D'Alvano, 2014).

2.2. Challenges and opportunities in technology supplier–service provider partnerships

Technology suppliers face an array of challenges in their B2B partnerships with service providers throughout the service innovation process (Miozzo & Soete, 2001). The interactions between service providers and B2B clients influence their ability to embrace new technologies in the service innovation process (Hidalgo & D'Alvano, 2014). Such conditions create continuous uncertainty about adopting new technologies, which leads to growing challenges for technology suppliers (Agarwal et al., 2015). Moreover, the extent to which service providers are willing to engage with technology suppliers and acknowledge their contributions in different phases of project development varies greatly according to the type of service strategy in place (Kowalkowski & Ulaga, 2017). Habitually, technology suppliers are more explorative and more likely to focus on disruptive technologies (Gallouj & Savona, 2009; Miozzo & Soete, 2001). However, service providers tend to prefer exploitation projects that aim to generate revenue stemming from improved services (Chang et al., 2012; Pavitt, 1984; Wieland et al., 2017).

The size of technology suppliers is also a relevant challenge, particularly when technology suppliers require increasing participation of different teams in the service innovation process (Hidalgo & D'Alvano, 2014). Relatively small but more specialized technology suppliers prefer their service partners to provide operating experience and testing facilities throughout the service innovation process (Pavitt, 1984). However, service providers remain reluctant to share such resources with new suppliers or those with whom they do not have a close and complementary relationship (Agarwal et al., 2015). Moreover, the size of technology suppliers becomes a critical challenge when they have to appropriate technological advantage from the service innovation process (Hidalgo & Herrera, 2020). For large-scale technology suppliers, technological leads are maintained through know-how and secrecy even after integration of technologies within the service innovation process (Kowalkowski et al., 2017). However, small technology suppliers often fail to benefit from secrecy and lengthy technical lags or properly appropriate value from technologies mainly due to the dominant control of service providers over the service innovation process and their detailed understanding of client requirements (Kowalkowski & Ulaga, 2017; Miozzo & Soete, 2001).

Nonetheless, despite the considerable challenges that technology suppliers face in B2B partnerships with service providers throughout service innovation process, they remain strong sources of technological opportunity (Biemans & Griffin, 2018; Chang et al., 2012; Miozzo & Soete, 2001). Partnerships with external technology suppliers enable service providers' internal development teams to better evaluate the effectiveness of new technologies within the service innovation process (Hidalgo & D'Alvano, 2014). It offers opportunities for service providers and technology suppliers to develop and improve the performance of the service innovation process (Chang et al., 2012; Helkkula et al., 2018). The collaboration also enables technology suppliers to explore technological opportunities, design prototypes, and evaluate the success of the service innovation process and, ultimately, its outcome (Kowalkowski & Ulaga, 2017;

Miozzo & Soete, 2001). B2B partnerships between technology suppliers and service providers also facilitate faster resolutions to common problems in the service innovation process via new technologies (Gallouj & Savona, 2009).

2.3. Technology supplier–service provider partnerships: the introduction of technologies

A review of the extant B2B service innovation literature substantiates the role of technologies and the way they facilitate the B2B partnership among key members involved (Gallouj et al., 2015; Kowalkowski & Ulaga, 2017; Storey et al., 2016). While the partnership between a technology supplier and a service provider holds different challenges and potential opportunities (Dotzel & Shankar, 2019; Kowalkowski & Ulaga, 2017), it also leads to the introduction of technologies with different impacts on the service innovation process (Chang et al., 2012; Hidalgo & D'Alvano, 2014; Hidalgo & Herrera, 2020; Miozzo & Soete, 2001). The literature reveals that the above B2B partnership results in the introduction of four groups of technologies. These include (1) technology for efficiency, (2) technology for effectiveness, (3) technology for uniqueness and novelty, and (4) technology for improving customer experience.

2.3.1 Technology for efficiency

Efficiency refers to doing things in a way that is faster, cheaper, and ultimately simpler (Weijters et al., 2007). Improved interactions between B2B partners in the service innovation process can provide viable and innovative solutions for improving efficiency (Gallouj et al., 2015). Perhaps, the most common type of technologies for improving efficiency of the service innovation process has been the introduction of self-service technologies by a growing number of technology suppliers (Meuter et al., 2003; van Beuningen et al., 2009). In a B2B environment, technological innovations aimed at improving efficiency will enable the service provider to offer customized solutions to B2B clients (Biemans & Griffin, 2018; Helkkula et al., 2018). Indeed, it is not surprising that the service innovation literature has identified several

ways that technology can improve efficiency of the service innovation process (Sakata et al., 2013; Snyder et al., 2016). For instance, service providers can deliver efficiency as an outcome of the service innovation process by using information technology and reducing the search cost between buyers and sellers (Hidalgo & Herrera, 2020; Parasuraman & Colby, 2015). Technology can also result in efficiency of the service innovation process through the modularization of service, in which key activities are allocated to different B2B members (Tuunanen & Cassab, 2011).

2.3.2 Technology for effectiveness

Technology suppliers can offer technologies to their B2B partners that affect efficiency and effectiveness simultaneously (Hidalgo & Herrera, 2020; Miozzo & Soete, 2001). While efficiency provides simplicity, speed, and economies of scale (Evangelista & Sirilli, 1998), effectiveness represents benefits of using technology to properly manage resources and improve the productivity of the service innovation process (Rust & Huang, 2012). In other words, effectiveness is about producing desirable results through the proper use of available resources. Technology suppliers can offer technologies that enable the service provider to benefit from their existing resources by more effectively reaching the same target market (Wirtz & Zeithaml, 2018). In this context, the introduction of technologies ensures that the service innovation process is outcome-based in a way that is cost effective and satisfies market demand (Froehle et al., 2000; Helkkula et al., 2018). B2B partnerships between technology suppliers and service providers have also led to the introduction of technologies other than those that replace human interactions in repetitive encounters (Marinova et al., 2017). Instead, such technologies focus on the process-based success of service innovation process by elevating service effectiveness and the proper use of resources (Storey et al., 2016; Witell et al., 2017).

2.3.3 Technology for uniqueness and novelty

In the past three decades, there has been extensive research on the introduction of novel technologies and their influence on the service innovation process (Phaal et al., 2004; Sakata et al., 2013; Snyder et al., 2016). Various dimensions of the service innovation process can be improved by unique technologies, whether service providers are aiming to offer radical or incremental changes to their services (de Brentani, 2001; Dotzel & Shankar, 2019). Novel technologies used in B2B service innovations can add consistent quality to the process or its outcome over time, which can revolutionize the service innovation process (Dotzel & Shankar, 2019; Wieland et al., 2017). Technology suppliers can also offer unique information and communication technologies to service providers, which can improve the productivity and overall performance of the service innovation process (Hidalgo & Herrera, 2020; Huarng, 2011). Storey et al. (2016) underscore the importance of constant technological investment as a successful process-based strategy in the service innovation process. Hidalgo and Herrera (2020) also highlight the important role of key B2B members, such as technology suppliers, in facilitating the introduction of new technologies and enabling the success of outcome- or process-based service innovations.

2.3.4 Technology for improving customer experience

The service innovation literature includes various studies that focus on the impact of customer-facing and self-service practices from a customer and firm perspective (Meuter et al., 2003; Weijters et al., 2007). The literature also highlights that for technology to reliably improve customer experience, continuous and strategic investments in resources are required across different dimensions of services innovation to improve both process and outcome (Larivière et al., 2017; Voorhees et al., 2017). As opposed to technology's impacts on efficiency and effectiveness, improving customer experience may require the integration of new resources to operationalize the service innovation process (Alam, 2006; Snyder et al.,

2016). Prior research has also generated knowledge on how B2B and B2C customers can co-create value and how their experience with different service interfaces can affect both the process and the outcome of service innovation (Dotzel et al., 2013; Grenha Teixeira et al., 2017). To classify innovative service ideas in a way that can increase firm value, multilevel methods for service design have emerged that include different aspects of the service innovation process, while ultimately improving its outcome (Alam, 2006; Bitner et al., 2008). With the aim of improving the outcome of service innovation, service providers can work backward with their technology suppliers to identify technological solutions that benefit the process of service innovation, the firm, its technology suppliers, and its B2B clients (Gallouj & Savona, 2009; Patrício et al., 2011). As a result, Fig. 1 presents our conceptual framework,

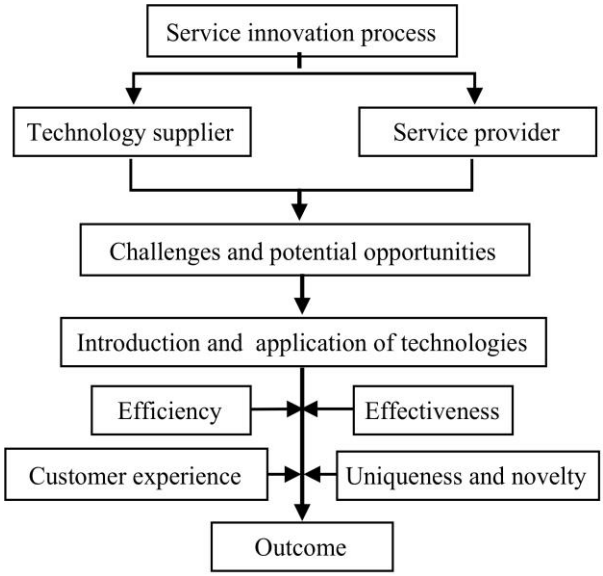

Fig. 1. Conceptual framework: Technology supplier–service provider partnership, challenges, opportunities, the introduction of new technologies, and their effects

This section highlights (1) the importance of B2B partnerships between technology suppliers and service providers in the service innovation process, (2) discusses key challenges and potential opportunities that emerge due to B2B partnerships between technology suppliers and service providers, and (3) explains that B2B partnerships result in the introduction of new technologies. These technologies affect the service innovation process in four primary ways:

(i) technology for efficiency, (ii) technology for effectiveness, (iii) technology for uniqueness and novelty, and (iv) technology for improving customer experience. Table 1 provides a summary of the literature and highlights key impacts of technology in technology suppliers–service provider partnerships in the service innovation process. Conclusively, Fig. 2 illustrates the development of the conceptual framework using our key understanding of the literature, including the specific stream and identified gap, the theoretical view, and the understanding of the practical background.

Table 1
Summary of the effects of technology on the service innovation process resulting from B2B partnerships

Introduction of technology	Key studies	Key impacts of technology
Technology for efficiency	Evangelista and Sirilli (1998)	Technology increases the overall efficiency of service innovation process.
	Parasuraman (2000)	Technology enables greater flexibility in firm–consumer interactions.
	Weijters et al. (2007)	Self-service technology (SST) accelerates business activities.
	Maglio & Spohrer (2008)	Technology improves key elements of service systems.
	Tuunanen & Cassab (2011)	Technology facilitates information management and smart service processes.
	Evanschitzky et al. (2015)	SST help firms innovate services constantly.
	Gallouj et al. (2015)	Technology affects human capital and productive systems.
Technology for effectiveness	Atuahene-Gima (1996)	Technology enables utilization of skills and resources.
	Froehle et al. (2000)	Information technology affects the effectiveness of the service innovation process.
	Chang et al. (2012)	Technology enables appropriable service mechanisms.
	Rust and Huang (2012)	Advanced automation affects service innovation process effectiveness.
	Heidenreich et al. (2015)	Technology improves the effectiveness of service recovery strategy.
	Marinova et al. (2017)	Smart technology–mediated learning elevates service effectiveness.
	Wirtz and Zeithaml (2018)	Technology enables cost-effective service excellence.
Technology for uniqueness and novelty	Quinn (1988)	Service sectors benefit from sophisticated technologies.
	de Brentani (2001)	Technology as radical or incremental innovation affects business service processes.
	Miozzo & Soete (2001)	Breakthrough technological change transforms the nature of service sector.
	Phaal et al. (2004)	Managing technological advancements maintains a stream of innovative services.
	Story et al. (2016)	Technology facilitates the interactions and relationships across actors in a network.
	Wieland et al. (2017)	Novel technologies enable and affect service market practices.
	Dotzel & Shankar (2019)	B2B service innovations have potential to create firm value.
	Hidalgo & Herrera (2020)	Novel information and communication technologies add value to the service innovation process.
Technology for customer experience	Meuter et al. (2003)	Technology anxiety affects the customer's use of SSTs.
	Bitner et al. (2008)	Technology helps with the clear visualization of dynamic service innovation processes.
	Patricio et al. (2011)	Technology improves service process design and experience.
	Dotzel et al. (2013)	Technology creates value for a firm's service through greater customers satisfaction.
	Lariviere et al. (2017)	Technology is augmenting interactions in service innovation process.
	Voorhees et al. (2017)	Technology improves customer service experience.
	Lee (2018)	Technology-driven service encounters affect satisfaction.

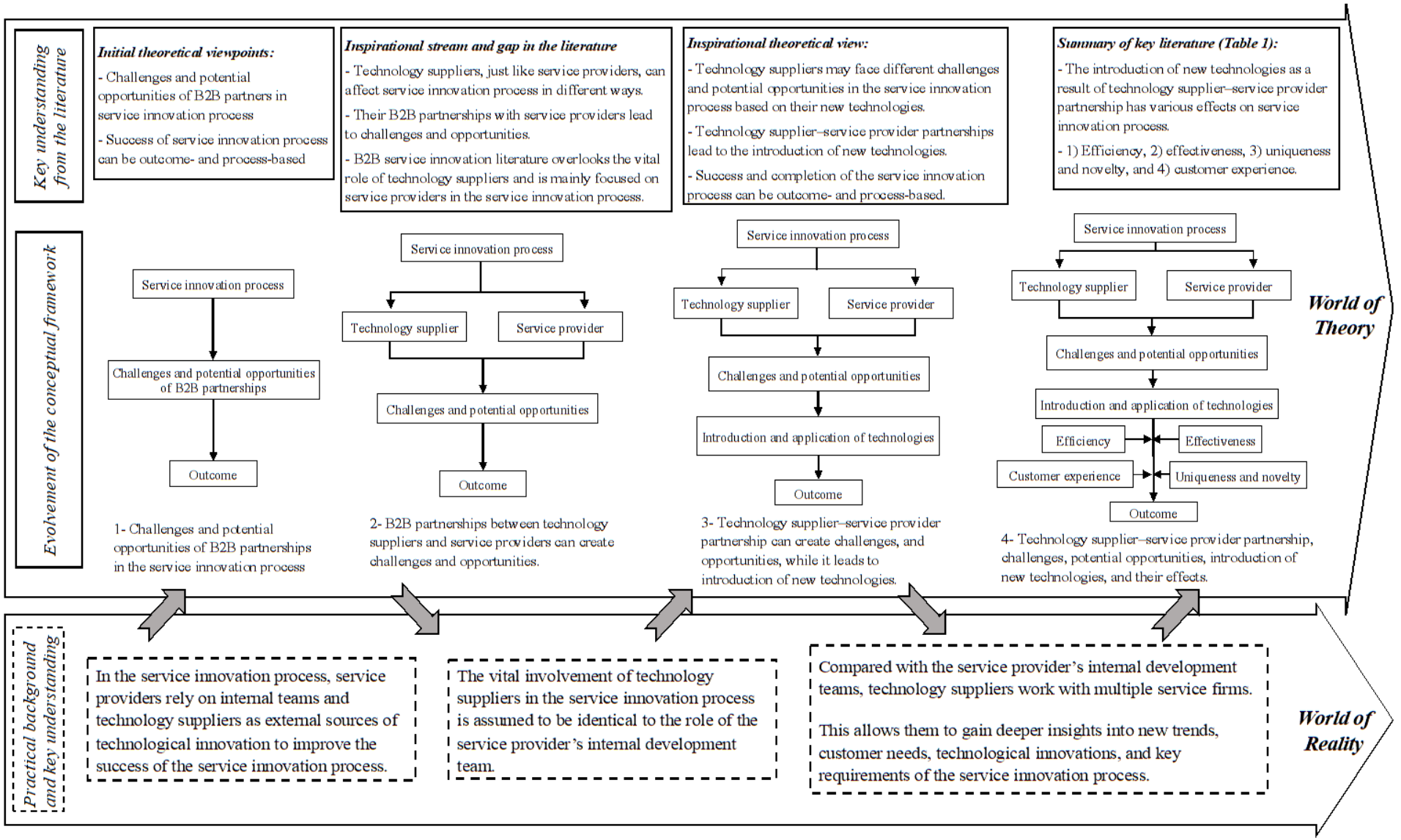

Fig. 2. Development of the conceptual framework

3. Method

3.1. Research approach

We adopted an abductive research approach as it enables us to explore an integrative procedure to theory, literature, and emerging data (Dubois & Gadde, 2002, 2014). It also best comports with our objectives to discover new circumstances and relationships by going back and forth among collected data, observations, and the latest developments in the literature (Bryant & Charmaz, 2012). Constructing our research problem—that is, exploring the challenges and opportunities of technology suppliers in their B2B partnership with service providers in the service innovation process—calls for additional theory and possibly new concepts. Indeed, our understanding of the challenges and potential opportunities need to be supplemented with models emphasizing the nature of B2B partnerships, particularly those in service innovation processes. Moving between empirical case study data and extant B2B service innovation literature enables us to expand our understanding of potential B2B relationships and obstacles in the service innovation process while providing extensive analysis and discussion.

Exploring the B2B partnerships between technology suppliers and a particular service provider in the service innovation process provides case-specific results. However, studying the challenges and opportunities that technology suppliers face in this process using multiple case studies, which involve multiple technology suppliers and service providers, enables us to understand real-life data and provide direct evidence for the issue being studied (Eisenhardt, 1989; Yin, 2014). This approach is a reliable method because (1) it is well-suited for generating new and valid insights into the early stages of construct development (Eisenhardt & Graebner, 2007), (2) it reflects the need for a higher sensitivity to quality criteria in business innovation research (Hillebrand et al., 2001), and (3) using multiple case studies to understand the events

and roles of different B2B partners can produce knowledge that is more insightful than simply working on a problem alone (Creswell, 2013; Eisenhardt, 1989).

3.2. Interviews

We present the results of four case studies from B2B partnerships between technology suppliers and service providers in the U.K. service sector. The primary data involve key informant (KI) interviews, combined with relevant policy documents and company's websites. The use of KIs is considered appropriate when the content of the research is an integrative examination and in-depth information cannot be obtained from quantitative analysis (Creswell, 2013; Johnston et al., 1999). KIs were required to hold a senior role in marketing, service development, research and development (R&D), technology management, or operational responsibilities. They were required to have a tenure of at least two years in their existing firms and have been directly involved in a recently completed service innovation project. We selected these areas to identify KIs with organizational knowledge, access to relevant information, and involvement in the service innovation process. We made direct contact with firms to identify the most appropriate individuals to gauge informants' ability to report on the phenomena in a B2B study (Johnston et al., 1999). We did not select KIs to be statistically representative of the members of the firms, but due to their specialized knowledge and involvement in the service innovation process, they were able to explain patterns of B2B partnerships for those involved in a process (Kumar et al., 1993).

Each case was tailored for one particular impact of technology on the service innovation process, as a result of a B2B partnership between a technology supplier and a service provider. We conducted a total of 32 interviews. Each case involved four interviewees at the technology supplier and four interviewees at the service provider. A dyadic perspective facilitates the understanding of different aspects of a problem with real-life data (Eisenhardt & Graebner,

2007). Typical interview questions included, “What were the biggest obstacles or areas of disagreements throughout the process?” “How did you handle conflict of interest with the technology/service firm?” “What were some of the key demands of the technology/service firm?” “What were the key responsibilities that you undertook in the service innovation process?” “Who is typically in charge of making key and final decisions?” Details of the KIs, including a summary of each case, appear in Table 2.

Table 2
Summary of cases and key informants (KIs) in the service innovation process

Case	Key impact	Technical change	Technology supplier's KIs in the service innovation process	Service provider's KIs in the service innovation process	Case summary
1. Biometrics	Efficiency	Introduction of a fast and reliable way to manage security threats via software development	R&D director, technology manager, digital marketing manager, marketing and sales manager	Service manager, marketing and sales manager, technology marketing manager, innovation manager	Biometrics technology has the system potential for comprehensive tracking and analysis of client behavior. Its application increases efficiency through the automation of communication between end users with several AFIS (automated fingerprint identification system) solutions. The partnership developed and tested fingerprint and face recognition software, which determined a customer's basic demographics. The data are used to establish a pattern of customer behaviors.
2. Video marketing	Effectiveness	Creating digital commerce content by integrating software and limited web templates	Service manager, chief technology manager, marketing manager, sales manager	Technology officer, marketing manager, category manager, digital marketing manager	Big content cloud technology delivers rich content production, analytics, and publishing capabilities. The collaboration developed a tailored version of a software platform to support the service provider in the creation and distribution of web content using existing resources. The technology supplier created a bespoke solution that uses web templates and downloading functionality. This enabled the service provider to properly manage its resources with limited investment on further updates.
3. Dynamic product colorization	Uniqueness and novelty	Offering a new configuration of common parts through software and content development	Service manager, chief technology officer, business development manager, R&D director	Technology manager, sales director, digital marketing manager, vice president of sales	The technology enables configuration of visuals with various patterns. The collaboration created a sophisticated algorithm that enabled rendering product images on-demand and through URL parameterization. Product colorization supports the sophisticated building of a workflow. This starts from initial SVG (scalable vector graphic) template development to deployment in dynamic media on the web. Benefiting from such a distinct algorithm, the templates can facilitate the image transcoding and caching services built into content-as-a-service platform.
4. Mobile app	Customer experience	Allocation of a share of traffic from website to mobile app and seamless experience	Service manager, technology manager, R&D director, innovation manager	Marketing manager, service manager, retail sales director, community manager	The project targeted areas, where aiming for the majority of a target market and providing convenience would create the most value. This resulted in the creation of a new app that was built specifically to incorporate cutting-edge design, seamless navigation, and trending features such as spotlight search and touch and face ID for smartphone users. The technology delivers improved customer experience across all user channels, including between the website and each mobile app. The technology was also developed to cater to changing customer demands and boost loyalty.

3.3. Coding process

The interview process followed the procedures described in Yin (2014). Set questions were developed for the interviews, although departures from this structure were permitted in the interest of achieving more depth and detail regarding the B2B partnership between technology suppliers and service providers in the service innovation process. After conducting the interviews, we performed coding, clustering, and reduction to obtain a coding scheme, in line with the relevant literature (Eisenhardt, 1989; Strauss & Corbin, 1998). Gioia et al. (2013) present three key steps for qualitative data analysis: first-order concepts, second-order themes, and aggregate dimensions. The researchers went through different stages of refining and data coding to agree on the final first-order concepts. We followed the same steps for second-order themes and aggregate dimensions, which resulted in categorizing five dimensions highlighting challenges and opportunities for the service innovation process. To improve the reliability of our results, we randomly selected 15% of the codes, including first-order concepts and second-order themes, and tried to identify each pattern again. As a result, we reached agreement in coding in more than 85% of the cases during a follow-up discussion with 15 KIs. Finally, we systematically compared the emergent directions and patterns with the relevant literature to test their potential for explaining emerging patterns, addressing conflicts, and improving the overall rigor of the study. As a result, we reached theoretical saturation—the point that incremental learning becomes insignificant (Eisenhardt, 1989). We summarize the data structure in Fig. 3.

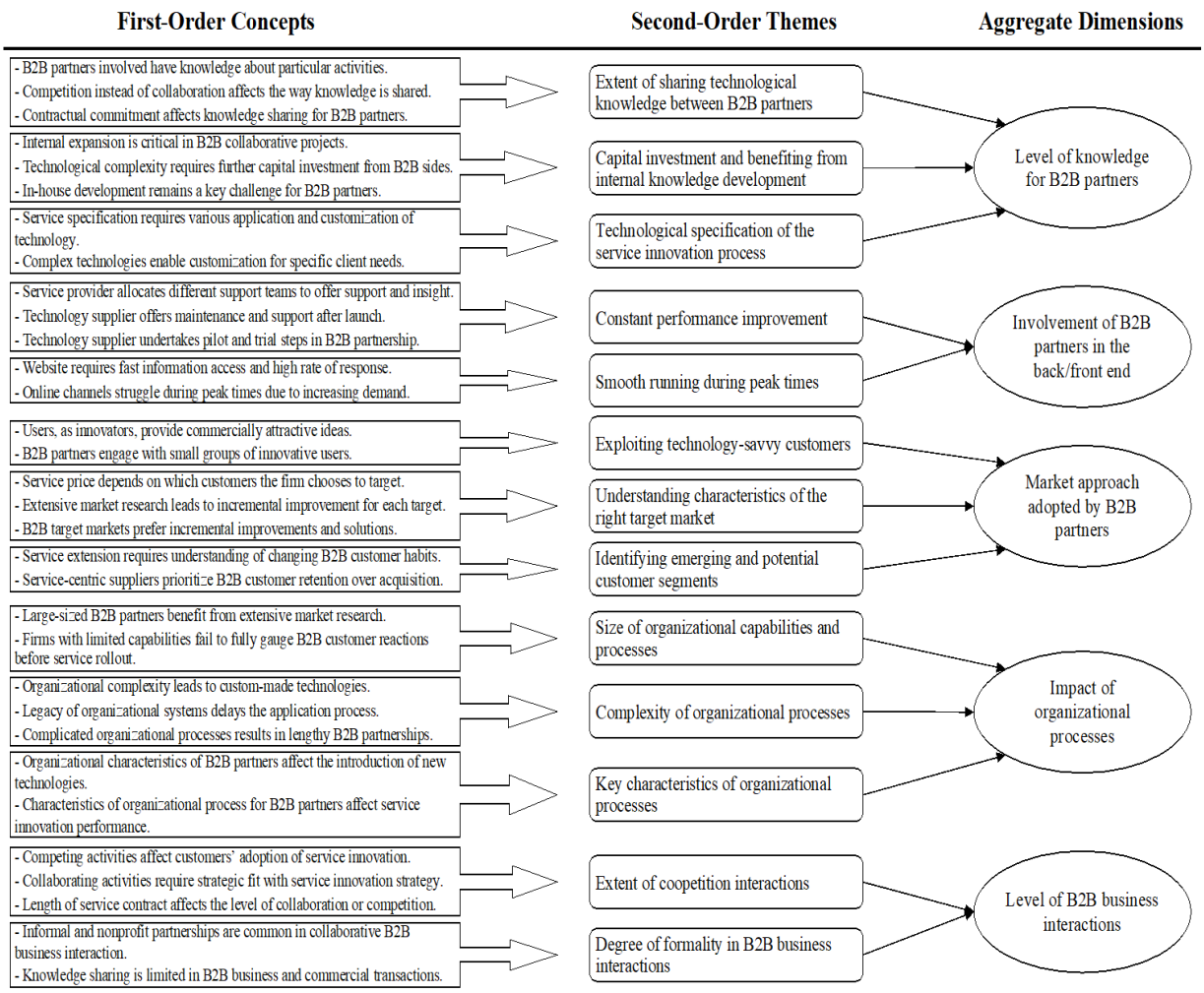

Fig. 3. Data structure

3.4. Within-case, data reduction, and cross-case analysis

We analyzed data obtained from the interviews separately to get a detailed picture of the B2B partnership in the service innovation process for each case. Following the guidelines for within-case analysis (Yin, 2014), we performed data reduction and wrote two- to three-page case descriptions on each technology case. The case stories were submitted to KIs to check that they did not contain information likely to compromise their service innovation process plans. Such feedback from KIs is essential to prevent observer bias and establish credibility (Strauss & Corbin, 1998). After identifying key challenges and potential opportunities of the service innovation process, we performed a comprehensive set of comparisons across the four cases.

This enabled us to determine where similarities and differences existed (Creswell, 2013; Yin, 2014) regarding the level of partnership for technology suppliers and service providers in the service innovation process.

Furthermore, we benefited from extant B2B service innovation literature as our sensitizing concept to help us guide the overall research problem and set key directions for our study. The theoretical lens of B2B partnerships between technology suppliers and service providers in the service innovation process served as a general reference and guide for linking theory to practice (Bowen, 2006; Glaser et al., 2013) rather than a typical presentation of given conditions (Sandberg & Tsoukas, 2011). This foundational starting point enabled us to discover, explore, and understand the vital encounters that key B2B partners face. Moreover, we used sensitizing concepts as groundwork for the data analysis and to grasp the logic of practice that is more relevant to management theories (Bowen, 2006; Sandberg & Tsoukas, 2011). We proceeded by examining first-order concepts, generating second-order themes, and developing aggregate dimensions that contributed to our theoretical lens and the building blocks of our framework. For example, after conducting initial interviews for each case, we observed that the B2B partnership between technology suppliers and service providers in the service innovation process is heavily influenced by B2B partners' level of technological knowledge. To better understand this, we drew on the B2B service innovation literature to guide further data collection and analysis, enabling us to elaborate on transactional and relational terms. Different levels of technological knowledge between both partners can also result in challenges, potential opportunities, roles, and key characteristics of B2B partners involved in the service innovation process. After data collection, we held two feedback sessions, with an appropriate gap between them to work on the notes we received. We received valuable comments from our respondents that helped us improve our results, discussion points, and managerial implications.

4. Findings

The B2B partnership between technology suppliers and service providers in the service innovation process happens at various levels and is based on different dimensions. Our four case studies demonstrate this. These dimensions may be related to the B2B partners themselves, including level of knowledge and technological investment, their ability to offer technological specifications, their involvement at the front or back end to improve performance and productivity, and different orientations toward a market focus or market disruption. Moreover, these dimensions may be related to conditions surrounding the service innovation process, including complexity and characteristics of B2B partners' organizational process, the size of their organizational capabilities, the degree of formality in their business interactions, and the extent to which they collaborate or compete (i.e., coopetition).

As a result, we identified five distinct groups of challenges and potential opportunities throughout the service innovation process: (1) level of knowledge of the key B2B partners involved in the service innovation process, (2) involvement of the B2B partners in the back and front end of the service innovation process, (3) market approach adopted by the B2B partners in the service innovation process, (4) impact of the organizational process on the service innovation process, and (5) the level of B2B business interactions (including formality, collaboration, and competition) in the service innovation process. Table 3 provides an overview of the aggregate dimensions, second-order themes, first-order concepts, direct quotes, and KI IDs.

Table 3

Overview of aggregate dimensions, second-order themes, first-order concepts, direct quotes, and key informant (KI) ID

Aggregate dimension	Second-order theme	First-order concept	Direct quote	KI
Level of knowledge for B2B partners	Extent of sharing technological knowledge between B2B partners	B2B partners involved have knowledge of particular activities.	"We benefit from application-programming interface (API).… We specialize in how conversion process for product types can drive average-order-value while providing unique functionality for the product personalization that we offer."	29
		Competition instead of collaboration affects the way knowledge is shared.	"Normally tech firms work with us and our competitors simultaneously, this makes collaboration and data sharing risky…. This creates a disconnect between teams, involved from both sides."	4
		Contractual commitment affects knowledge sharing for B2B partners.	"When we have a bonded contract with transactional commitment with the service provider, they have certain level of expectation for knowledge giving simply because they are paying for it."	23
	Capital investment and benefiting from internal knowledge development	Internal expansion is critical in B2B collaborative projects.	"Through working with the firm's in-house design team, the process could provide various applications for their audience with little adjustment to their capabilities."	25
		Technological complexity requires further capital investment from B2B sides.	"The process required more than a simple technology; we didn't have all the resource needed.… Joint investment included capabilities, services, advice, and constant improvement to the biometrics systems."	14
		In-house development remains a key challenge for B2B partners.	"When you are in transactional commitment, every partnership is looking for a bigger piece of development pie,… some sort of internal learning that they can use for future development."	17
	Technological specification of the service innovation process	Service specification requires various application and customization of technology.	"We have the capabilities required for the development of customized value-added solutions. Services are like people, have different needs and demand different levels of technology customization."	1
		Complex technologies enable customization for specific client needs.	"Sometimes if you can develop complex solutions, you have a better chance of sealing a service contract.… Whatever needs they come up with, you know you have a powerful tool to tackle it."	11
Involvement of B2B partners in the back/front end	Constant performance improvement	Service provider allocates different support teams to offer support and insight.	"Throughout the process, different teams monitored each step to make sure that the dynamic media reduces the time and cost of uploading new collections behind the scenes."	22
		Technology supplier offers support and maintenance.	"The process had to be optimal, we offered under the hood efficiency in backstage by optimization of images for all channels and high-resolution master asset."	19
		Technology suppliers undertake pilot and trial steps in B2B partnership.	"We use the pilot step as an opportunity to make sure things are going smooth and with limited to no lag at the customer front…. It is also a chance to see if the client really likes the service or not."	32
	Smooth performance running during peak times	Website requires fast information access and a high rate of response.	"The process helped the firm's website to deliver lightning-fast image rendering at 99.99% availability, also fitting with the slow Internet connection…. This improved the customer-facing side of the process."	21
		Online channels struggle during peak times due to increasing demand.	"Christmas time is a nightmare…. [The] firm's website needed faster conversion speed and we were focused on a new algorithm that could generate on-demand images of product colors."	15
Market approach adopted by B2B partners	Exploiting technology-savvy customers	Users as innovators provide commercially attractive ideas.	"Given the diversity of product categories, we dedicated in-house mobile testing lab to test and run simulators with customers for high-level of performance and smooth experience."	2
		B2B partners engage with small groups of innovative users.	"The small, focused groups are an opportunity for us, they help us facilitate a shorter process instead of nurturing it unnecessarily."	8

	Understanding characteristics of the right target market	Service price depends on the firm's choice of target customers.	"Service firms pay particular attention to their most profitable customer groups as they can offer tailored solutions and charge them premium, however they find fit."	13
		Extensive market research leads to incremental improvement.	"We are talking about a slow adopting market, it's not an Airbnb or Uber type of innovation, you know; it's market research and baby steps to avoid any risk."	16
		B2B target markets prefer incremental improvements and solutions.	"Our partners prefer minimal disruption, simply because they don't want to do major changes over one night, but if they like the solution, they commit to gradual changes to get there eventually."	6
	Identifying emerging and potential customer segments	Service extension requires understanding of changing B2B customer habits.	"I suggested seeing what millennials are into.… The process led to an app with user-friendly design, seamless navigation, functional interface, spotlight, and augmented reality."	28
		Service-centric suppliers prioritize B2B customer retention over acquisition.	"We develop a customized and value adding solution and invest a lot of time and money to improve our relationship, that is just less headache that acquiring new customers."	26
Impact of organizational processes	Size of organizational capabilities and processes	Large-sized B2B partners benefit from extensive market research.	"We always do extensive market research and constantly update our CRM systems.… How much we rely on market research is a completely different story though."	9
		Firms with limited capabilities fail to fully gauge B2B customer reactions before service rollout.	"Often if you are a small developer, or even a small service firm, you'll never know how your clients are going to react till rollout, no matter how much prototyping you do."	30
	Complexity of organizational processes	Organizational complexity leads to custom-made technologies.	"Their organizational processes are so complicated, that they always ask us to rather bespoke the technology so it will better fit their systems."	10
		Legacy of organizational systems delays the application process.	"Because of the legacy of organizational processes, it takes ages to actually integrate the new solution into the spaghetti of their old systems and innovate new services."	27
		Complicated organizational processes result in lengthy B2B partnerships.	"They always know what they want and why they want it, they also want it fast, but their processes are so complicated that sometimes it takes a long time for our partnership to get there."	3
	Key characteristics of organizational processes	B2B partners' organizational characteristics affect the introduction of new technologies.	"You always know how much change they can absorb based on their organizational attitude and persona; we have to be careful not to offer something that they raise eyebrows so much."	5
		Characteristics of B2B partners' organizational processes affect service innovation success.	"For some of them, a learning organizational character is a gift.… Such an attitude is not a given you know, sometimes they don't want to learn at all, they just want to see return on investment."	18
Level of B2B business interactions	Extent of coopetition interactions	Competing activities affect customers' adoption of service innovation.	"Usually, our collaboration turns into a competition for activities that are more visible to customers.… It is a selling point that leads to faster adoption and brand recognition for us."	7
		Collaborative activities require strategic fit with service innovation strategy.	"Backstage activities that are invisible to customers are more collaborative, you need the right synergy there, commitment to collaboration and same language for service strategy."	12
		Length of service contract affects the level of collaboration or competition.	"Existing partners have priority for lengthier and more chunky contracts, long contracts need more collaboration, but short ones turn into a competition since everyone is selfish there."	20
	Degree of formality in B2B business interactions	Informal and relational partnerships are common in collaborative B2B business interaction.	"When there is a lot of learning, we prefer to work with friends and those we know, because we don't have to treat it as a strict business and commercial transaction, rather close relationship."	24
		Knowledge sharing is limited in B2B business and commercial transactions.	"Commercial and contractual transactions are strict; it is like everything is already decided for you.… You have to be careful how much you put into it and wary of the commercial rules."	31

4.1. B2B partners' level of knowledge in the service innovation process

Service providers usually allocate resources to in-house and internal development. This was identified in our analysis for biometrics, dynamic product colorization, and a mobile app. However, there were often significant differences in terms of technological knowledge that led to disagreements between technology suppliers and service providers. This became evident in the case of an automated fingerprint identification system (AFIS) for biometrics and a scalable vector graphic (SVG) for dynamic product colorization. In the biometrics case, a solution was a gradual knowledge transfer from technology supplier to service provider. Despite these differences, service providers had to rely on technology suppliers for technical knowledge.

"You know the big boys in the top 5, they invest, they've got robots walking around their offices, hollow lens, artificial intelligence, but they still rely on tech firms for pure knowledge." (Biometrics, KI12: R&D Director, technology supplier)

The growing knowledge competition between technology suppliers and service providers' internal development teams put more pressure on the technology supplier. This was captured for a comprehensive tracking technology used in the case of biometrics and the mobile app. Indeed, the growing number of technology suppliers interested in the U.K. market led to a situation in which the nominated technology supplier had to either accept the challenges of dealing with the service provider's internal development team, and the emerging disagreements, or be easily replaced by the service provider.

"We get a list of tech candidates who are interested in collaboration.... We have subscribed membership in Gartner and Forrester; we simply upload whatever our problem is, and a list of technology suppliers pops up." (Mobile app, KI29: Marketing Manager, service provider)

4.2. B2B partners' involvement of in the back and front end of service innovation process

Different KIs referred to how the vital involvement of B2B partners in the front and back end of the service innovation process can affect the general performance and outcome of the process

significantly. This was identified across the four cases. Often, service providers needed technology suppliers to be cross-functional. Despite having particular expertise and technological know-how, they had to be dynamic and able to impact different activities simultaneously. This was captured in the context of developing and supporting a software platform that enables continuous distribution of web content in the case of video marketing and the mobile app.

"All the time you have a river of demands to deliver several things at once.… You will never be able to process and implement all of that without a mix of street-smart, tech savvy, and behind-the-desk people." (Video marketing, KI27: Marketing Manager, technology supplier)

The growing demand that the technology supplier had to be involved at both ends of the service innovation process led to some challenges for them. This was evident in the case of the mobile app, where the technology supplier had to undertake performance optimization because of adding seamless location navigation while simultaneously running a pilot test. A solution was to temporarily outsource the pilot experiment to a supplier's trusted third party. In addition, despite the active involvement of technology suppliers at both ends of the process, service providers often overlooked their value and contribution to the ultimate success of the service innovation process. In the case of the mobile app, technology suppliers came up with a solution to shorten the review process. This enabled them to better show their contribution to the process.

"Technology supplier was like, we are going to drop-code every four weeks, and we are going to demonstrate the value of our support to your business, process, B2B partners, and customers etc." (Mobile app, KI9: Sales Director, service provider)

4.3. B2B partners' market approach in the service innovation process

Data analysis uncovered major conflicts between the perception of technology suppliers and service providers in terms of their market approach. B2B partners applied various techniques to obtain customer feedback. This was captured in the biometrics, dynamic product colorization, and mobile app case studies. It caused some confrontations in managerial focus, as the service providers

relied extensively on market research while the technology suppliers preferred to be disruptive. While service providers preferred to involve mass-market customers, technology suppliers preferred to engage with technology-savvy customers. This was particularly evident in the biometrics case, when the technology supplier wanted to trial a face and voice recognition software to understand patterns of customer behavior.

"There's massive investment by both partners on experimental labs. Different labs with different mindsets are used to see customers in action before rollout.… We'd like to be disruptive, so we are quite picky on who should try our future tech." (Biometrics, KI7: Technology Manager, technology supplier)

Despite this challenge, if the service provider was really interested in the technology, they would recommend incremental value-adding improvements as a solution. In the mobile app case, this solution led to a longer process; however, it enabled the technology supplier to offer incremental but continuous improvements and value-adding solutions.

"Making radical changes is way too risky for us, why bother when you can wait.… It is not like we are under so much pressure to be radical anyway. But sometimes the technology is so good, and everyone else is doing it, so we say yes to baby step changes." (Mobile app, KI723: Marketing manager, service provider)

4.4. The impact of organizational processes on the service innovation process

The growing importance of organizational processes, including the legacy of a system, complexities, and key characteristics, were mentioned across the four cases. Different KIs across the four case studies noted that a key challenge for technology suppliers, and often what prevented them from offering breakthrough technologies, was the legacy and complexity of service providers' organizational processes. Although a diverse array of new technologies is introduced to the service sector, the organizational processes for many service providers have yet to be responsive and adaptive to technological changes. As a solution, throughout the process of technological development, technology suppliers held various events in which service providers' senior managers

were invited to evaluate the technology and its development in advance. This was particularly evident in the cases of face recognition technology for biometrics and URL parameterization for dynamic product colorization.

"Quite often, they ask for a lot of changes to the technology.… Normally, we have to bespoke the technology to fit their processes.… If we wait for their old processes to be adjusted to technology, by the time it's ready, it'll probably be too late to launch it." (Dynamic product colorization, KI29: R&D Director, technology supplier)

Furthermore, the inevitable role of organizational capabilities impacted organizational processes and, ultimately, the introduction of new services. Large-sized B2B partners could benefit from their capabilities and undertake extensive market research or trial experiments. However, smaller firms with limited capabilities were more disruptive with a particular set of skills. Sometimes, a solution was to have multiple technology suppliers involved in one service contract with a particular service provider. That way, different activities throughout the service innovation process could be allocated to different suppliers. The importance of organizational capabilities was captured for tracking resources and analytical capabilities in the biometrics case and for the development of analytics and publishing capabilities in the video marketing case.

"If you are a small firm with limited resources, you come up with new projects faster, but you don't have the capabilities nor support to go ahead with it on your own…. You either have to land a large client or share a chunky contract with others." (Video marketing, KI18: Innovation Manager, technology supplier)

4.5. The level of B2B business interactions in the service innovation process

Data analysis uncovered key differences in types of business interactions and their impact on the success of the service innovation process. B2B partnerships can be a collaboration or competition depending on the type of busines activities and their visibility to customers. On the one hand, partnership can turn into competition for activities that are more visible to customers, partly because highly visible, customer-facing activities can lead to brand recognition. This was

evident for web template development in the video marketing case and dynamic media development in the dynamic product colorization case. On the other hand, activities less visible to customers were more collaborative, particularly when B2B partners had the same objectives and strategic fit. This was captured in the cases of dynamic product colorization and the mobile app.

"Maintenance and support are just easier if we don't have to do brand recognition for customers.… We know our objectives won't clash.… It is more about alliance than rivalry at this point." (Mobile app, KI18: Service Manager, technology supplier)

Moreover, the formality—that is, the extent to which the business interactions were relational or transactional—can become a challenge. In the biometrics case, the technology supplier was looking for informal feedback due to its existing relationships with the service provider's senior managers and their clients. It also tried to avoid the transactional commitment of business interactions, mainly because the technology was in the early stages of development. The same challenge was observed for trialing augmented reality in the mobile app case. In both cases, a solution was for the technology supplier to offer technical knowledge in exchange for early customer and senior manager feedback, without the hassle of transactional business commitments.

"Sometimes we are looking for help because it's a relationship … no more business transactions with loads of expectations and commitments.… But service firms always go like, if we help, what's in it for us." (Biometrics, KI16: Marketing & Sales Manager, technology supplier)

Finally, Table 4 presents a summary of our cross-case analysis exploring five aggregate dimensions across four cases.

Table 4
Summary of cross-case analysis for aggregate dimensions

Aggregate dimension	Case			
	1. Biometrics	2. Video marketing	3. Dynamic media customization	4. Mobile app
Level of knowledge for B2B partners	• Technology supplier is involved in fewer but more technical tasks. • Service provider aims for less knowledge-intensive activities to avoid further capital investment. • Technology supplier has superior advantage due to deeper knowledge than service provider.	• Technology supplier competes against imitation from service firm. • Technology supplier has to offer more flexibility in knowledge sharing. • Service provider's internal team has limited budget for knowledge training.	• Technology supplier is expected to engage in extensive knowledge sharing with internal team. • Technology supplier is dependent on service provider's market knowledge. • Service firm handles knowledge complexity between two teams.	• Technology supplier is a key source of knowledge and deals with the internal team's growing demands. • Technology supplier has to offer training for its partner's knowledge development. • Service provider lacks internal capabilities for productivity.
Involvement of B2B partners in the back/front end	• Technology supplier avoids dealing with complexity of customer big data at the front end. • Service provider uses its extensive knowledge from customer interaction at the front end.	• Technology supplier prefers the front end for brand recognition. • Service provider needs multifunctional suppliers. • Service provider focuses on back end for proper capital management.	• Technology supplier can better implement its knowledge only if focused on one end. • Service provider aims for capital investment on the back end if it impacts the front end.	• Technology supplier uses experimental labs at the back end. • Technology supplier is required to be involved in both ends. • Technology supplier must outsource pilot experiments.
Market approach adopted by B2B partners	• Technology supplier aims for disruption with limited attention to marketing requirement. • Technology supplier uses various algorithms for understanding new segments' behavior.	• Technology supplier wants a breakthrough to capture views and clicks. • Service provider wants to balance a better trade-off for its resources via incremental changes.	• Technology supplier prioritizes existing customers for return on investment. • Technology supplier must conduct extensive market research for customer acquisition.	• Technology supplier uses lead user involvement for market disruption. • Technology supplier prefers technology push for all segments. • Service provider prefers incremental changes.
Impact of organizational processes	• Large technology supplier has resources for disruptive technology. • Complexity of service provider's organizational process prevents breakthrough technologies. • New supplier is unfamiliar with service provider's organizational characteristics and its legacy.	• Small technology supplier facilitates faster service launch. • Small service provider has less complex organizational processes. • Technology supplier's organizational characteristics are more adaptive to market change.	• Organizational characteristics of service firm restricts performance. • Large service providers are more interested in technology application across all channels. • Existing technology supplier can better customize technology to fit service firm's outdated processes.	• Technology supplier with limited resources must share service contract with others. • Complex service process requires larger technology suppliers. • Service firm's organizational processes create trouble for supplier to synchronize data across channels.
Level of B2B business interactions	• Customer-facing activities lead to competition rather collaboration. • Transactional contract forces technology supplier to offer training and knowledge transfer.	• Short service contract turns into competition for brand recognition. • There is a lack of collaboration between supplier and service firm across multiple channels.	• Service provider is more collaborative for under-the-hood improvements. • Lengthy contracts delay launch but facilitate supplier advantage.	• Technology supplier wants beta testing due to relational interaction. • Technology supplier avoids contractual commitment of transactional interactions.

5. Discussion: Toward a service innovation process typology

The result of our data analysis including first-order concepts, second-order themes, aggregate dimensions, and within- and cross-case analysis enabled us to capture a more detailed picture of the journey that technology suppliers undertake as a result of their B2B partnerships with service providers in the service innovation process. We used data analysis and our understanding of the extant literature as the foundations for developing a service innovation process typology. A typology of service-related issues categorizes multiple types, each of which illustrates a combination of activities that may impact the process and result in different outcomes (Mills & Margulies, 1980).

As a result of developing a service innovation process typology, this research accomplishes multiple objectives. First, we offer a more detailed picture of the B2B partnership between technology suppliers and service providers in the service innovation process. Thus, our typology is based on two distinct facets: roles of technology suppliers and roles of service providers. Second, we identify different roles that technology suppliers and service providers undertake in the service innovation process. We developed these roles based on different combinations and states of aggregate dimensions. Third, we explain that linking different roles of technology suppliers and service providers in the service innovation process leads to different combination of activities. These activities can highlight the extent to which the service innovation process is outcome- and process-based. Fourth, we benefited from the relevant B2B service innovation literature—specifically, literature that highlights the importance of partnerships between technology suppliers and service providers, challenges and opportunities, and the introduction of technologies as a result of the B2B partnership. Drawing on this literature enabled us to improve the quality and validity of our typology. Fifth, following our data analysis and the extant B2B literature, we identified the extent to which the service innovation process, comprising different activities and different roles of technology suppliers

and service providers, can be outcome-based and process-based. We refined and validated the emergent versions of the typology, including different facets (i.e., different roles of technology suppliers and service providers), different combinations of aggregate dimensions, and the extent to which service innovation process is outcome- and process-based, through follow-up sessions with the KIs.

Following our data analysis, we identified five aggregate dimensions. Different combinations of aggregate dimensions for technology suppliers and/or service providers create four different roles: two for technology suppliers and two for service providers. Each of the identified roles has unique characteristics depending on the extent of the five aggregate dimensions. When technology suppliers benefit from a high level of knowledge (state of aggregate dimension 1), are involved in both the front and back end (state of aggregate dimension 2), are inclined to adopt disruptive market approaches (state of aggregate dimension 3), benefit from more adaptive organizational processes (state of aggregate dimension 4), and prefer a high degree of business interactions in both transactional and relational partnerships (state of aggregate dimension 5), they undertake the role of *differentiator*. Technologies that are introduced by a differentiator and as a result of B2B partnership with service providers in the service innovation process need further investment in capabilities, have higher risk of adoption, and require multifaceted expertise. In contrast, when technology suppliers acquire a low level of technical knowledge (state of aggregate dimension 1), are more involved in the back end (state of aggregate dimension 2), prefer to adopt a more customer-focused approach (state of aggregate dimension 3), have simplified organizational processes (state of aggregate dimension 4), and prefer an informal level of business interactions, as in relational partnership with limited contractual commitment (state of aggregate dimension 5), they undertake the role of *innovator*. Technologies that are introduced by an innovator and as a result of B2B partnership with service providers in the service innovation process can be characterized as

incremental extensions to existing technologies and do not require extensive adaptation of client's organizational processes.

Similarly, when service providers benefit from a high level of knowledge (state of aggregate dimension 1), are involved in both the front and back end of the service innovation process (state of aggregate dimension 2), adopt a more customer-focused market approach (state of aggregate dimension 3), have complex organizational processes (state of aggregate dimension 4), and prefer a formal and transactional level of business interactions (state of aggregate dimension 5), they undertake the role of *facilitator*. Service providers that act as facilitators perform a certain degree of leadership and supervision in the service innovation process. They need the B2B teams to create different working groups to better identify key areas for improvement. In contrast, when service providers have a low level of technical knowledge (state of aggregate dimension 1), prefer to be involved at the front end (state of aggregate dimension 2), adopt a more customer-focused approach (state of aggregate dimension 3), retain outdated organizational processes (state of aggregate dimension 4), and are inclined toward competitive business interactions (state of aggregate dimension 5), they undertake the role of *enabler*. Collaboration with a service provider as an enabler is easily anticipated through B2B partnership between two teams. Responsibilities can be easily determined in a reciprocal partnership and are predefined in many cases. Fig. 4 summarizes the state of the aggregate dimensions for each B2B partner, their roles, and key characteristics of the roles.

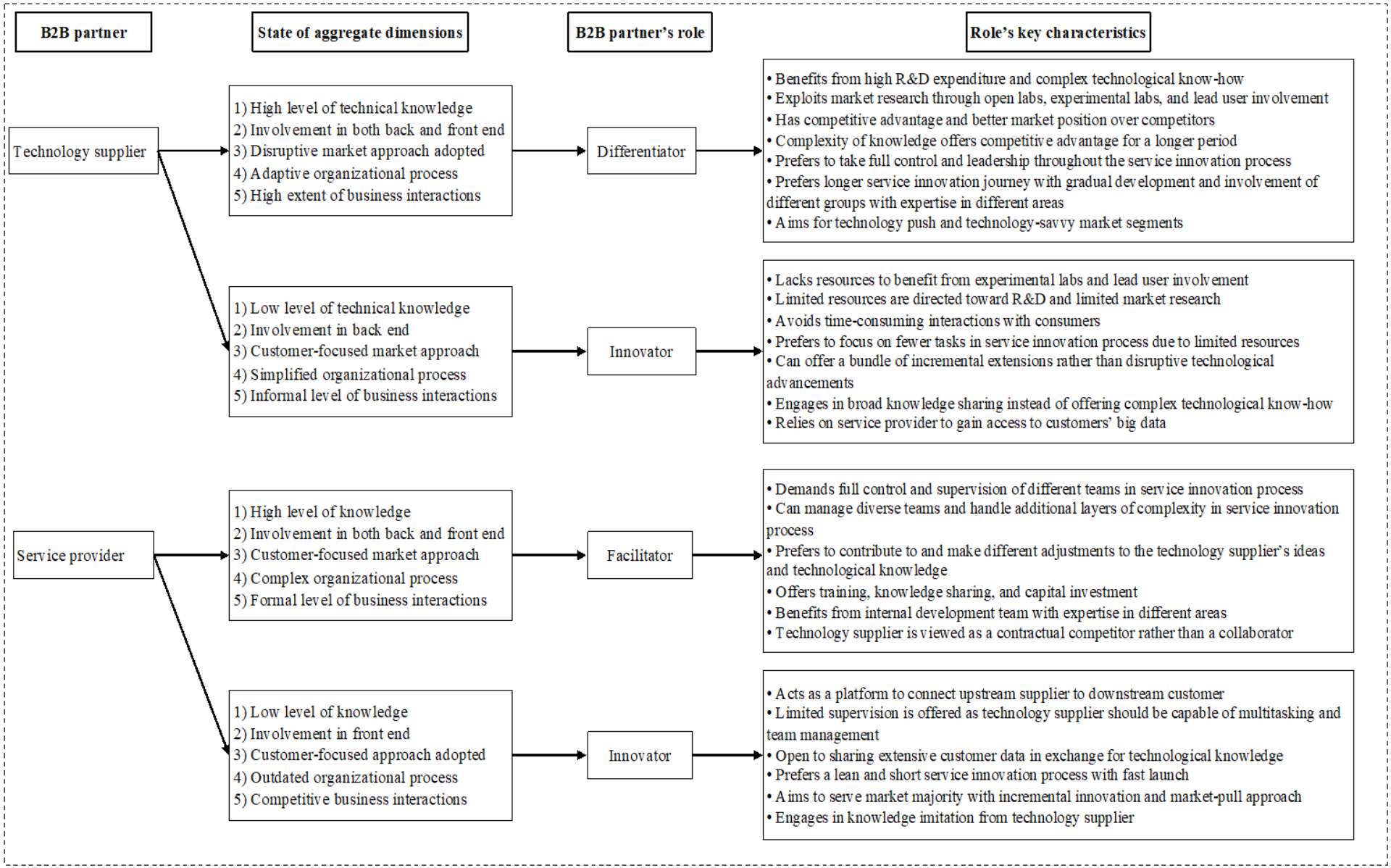

Fig. 4. Summary of B2B partners' roles, state of aggregate dimensions, and key characteristics

Meanwhile, given the extant B2B service innovation literature and our data analysis, the completion and success of the service innovation process (as a whole or in parts) can be categorized according to two value-adding conditions. The first is focused solely on the outcome at the individual project level (i.e., short-term success of the service innovation process through involvement of key members) or the program level (i.e., long-term success of service innovation process through involvement of key members over time) (de Brentani, 2001; Storey et al., 2016). In an outcome-based service innovation process, the focus on R&D, either undertaken by the service provider's internal team or proposed by the external technology supplier, can vary depending on the level of focus on customer involvement (Gallouj & Weinstein, 1997; Helkkula et al., 2018). For the service innovation process, being outcome-based is predicated on (1) incorporating the project level or the program level and (2) maintaining the focus on R&D or customer involvement.

Second, the completion and success of the service innovation process can also be grounded on the extent to which it is process-based, with the aim of creating technology-based improvements that affect existing services in different ways (Helkkula et al., 2018; Hidalgo & Herrera, 2020). In a process-based service innovation process, the customer role can vary from traditional market research to extensive lead-user involvement (Alam, 2006; Biemans et al., 2016). The main contributions of process-based approaches are the creation of new roles and activities as well as the time span of the innovation journey (Biemans & Griffin, 2018; Helkkula et al., 2018). For the service innovation process, being process-based is predicated on (1) creating new activities and roles, (2) the level of benefit derived from customer involvement, and (3) the preferred time span.

Several studies have theoretically distinguished outcome-based and process-based service innovation processes (Gallouj & Weinstein, 1997; Sirilli & Evangelista, 1998; Storey et al., 2016). However, in practice, managerial questions remain as to whether a service innovation

process, and its ultimate completion, are entirely outcome-based or process-based (Helkkula et al., 2018). In an actual service innovation exercise, the beginning and end of the service innovation process and their connections to outcomes may be unrecognizable or difficult to detect, particularly when different B2B members, who contribute to the process and its ultimate success, want to benefit and profit from service innovation in their own ways (Gallouj et al., 2015; Gallouj & Savona, 2009; Miles, 1993).

Furthermore, the main objective of service innovation activities and processes is to improve an existing service, preferably on an ongoing basis rather than a project with a definitive beginning and end (Helkkula et al., 2018; Snyder et al., 2016). The results from our case studies also demonstrate this. Continuity was probably a key reason that service providers demanded technology suppliers to undertake installation and maintenance, reiterating the ongoing nature of service innovation (Barras, 1986). This leads to a situation in which, in practice, the service innovation process delivers a hybrid model comprising objectives related to both outcome and process (Biemans & Griffin, 2018; Helkkula et al., 2018; Storey et al., 2016). As such, for each quadrant in our typology, we highlighted the extent of being both outcome-based and process-based for the service innovation process. In doing so, as we have explained, we have two to capture the extent of outcome-based and three criteria to capture the extent of process-based. Fig. 5 presents our typology, including different roles for B2B partners, combinations of different activities, and the extent of being outcome-based and process-based in the service innovation process.

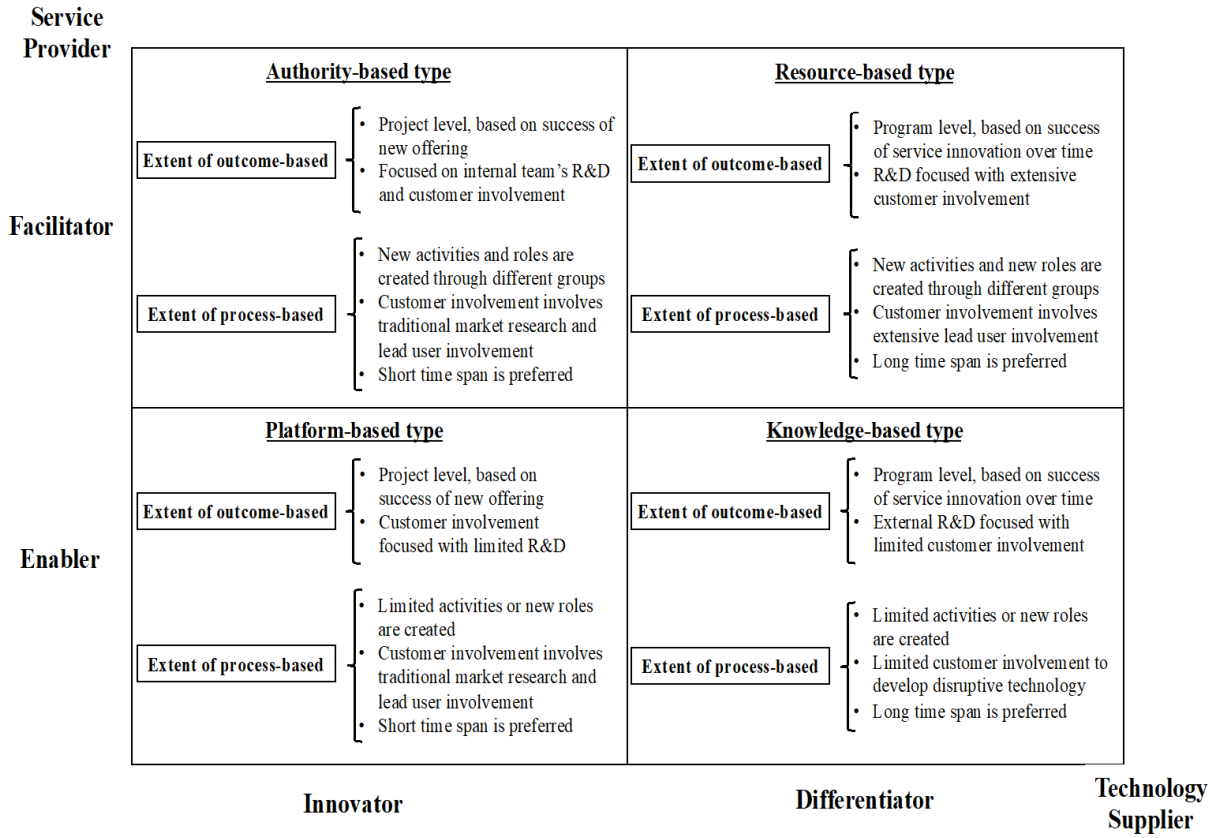

Fig. 5. Service innovation process typology

5.1. Authority-based type

The authority-based type involves the roles of technology supplier as *innovator* and service provider as *facilitator* in the service innovation process. Our cases highlight that the facilitating role of service provider is becoming increasingly important, as complex service innovation processes require involvement of different team members. A facilitator benefits from a high level of knowledge and prefers to be involved at both ends of the service innovation process, while an innovator has a more limited level of technical knowledge and prefers to be involved at the back end only. In our cases, this required the service provider to function as a leading member to harmonize and manage the B2B interactions between different teams involved in the service innovation process. Because the service provider was able to observe customer reactions both directly and indirectly, it could also adjust to the ideas and knowledge of the technology supplier and create new activities for different requirements. As a result, the

technology supplier was dependent on the service provider's authority and provision of technical training, knowledge sharing, customer involvement, and resource integration. This created a challenging condition in which the technology supplier was highly dependent on the service provider and the knowledge of its internal team.

In such cases, regardless of whether the service innovation process is outcome- or process-based, there is an extensive focus on customer involvement. Due to its leading position, a service provider that is a facilitator demands formal and transactional business interactions. This creates a situation in which the service provider can control the level of knowledge sharing between B2B partners. Its internal development team can benefit from this control as well. While an innovator has simplified organizational processes, a facilitator retains its complex processes, leading to a situation in which changes to the service innovation process are incremental due to the complexity of the facilitator's organizational processes. As a result, the extent to which the service innovation process is outcome-based is focused on short-term results. Furthermore, a shorter time span is the preferred choice when the service innovation process is process-based.

5.2. Platform-based type

The platform-based type involves the roles of technology supplier as *innovator* and service provider as *enabler* in the service innovation process. In an enabling function, the service provider acts as a platform that connects its upstream technology supplier to its downstream customers. Here, the service provider can help both its customers and the technology supplier in the service innovation process. The constraint of organizational capabilities for both the innovator and the enabler means that they prefer to be market-focused and require extensive customer feedback throughout the service innovation process. Furthermore, the service provider and technology supplier are pressured to focus on one end of the service innovation

process. Our analysis demonstrates that the innovating role of the technology supplier requires time and organizational capabilities to be exclusively allocated to fewer tasks. Whether the service innovation process is outcome- or process-based, being market-focused and less disruptive creates less risk and increases chances of success. This also leads to shorter and project level outcomes. While innovators prefer the back end and maintenance activities, enablers choose the front and customer-facing end of the process. Whereas the innovator benefits from simplified organizational processes, the enabler holds outdated processes due to the legacy of its organizational systems. This results in less flexibility and shorter time spans for the extent of being process-based. Due to resource and organizational capability constraints, innovators seek informal and relational business interactions to improve their limited knowledge. However, enablers consider their B2B business interactions a competitive partnership, which may involve imitation from service provider. As a result, each B2B partner is aiming for a larger share of the knowledge pie. Moreover, limited resources for both B2B partners lead to a situation in which being process-based entails limited activities and the creation of new roles.

5.3. Resource-based type

The resource-based type involves the role of technology supplier as *differentiator* and service provider as *facilitator* in the service innovation process. Probably the most challenging form of B2B partnership occurs in this type, mainly because both members benefit from proper resources and extensive knowledge. This enables both sides to be interested in partnership in both ends of the service innovation process. As a result, the extent of being process-based is predicated on the creation of new activities and roles across different groups. On the one hand, the facilitator functions as a leading member to properly allocate resources and manage the complexity of the service innovation process. On the other hand, the differentiator, which also focuses on resources and technical knowledge, tries to magnify the value of its technology to

extend its involvement in the service innovation process. Because they benefit from extensive knowledge and can manage different activities, the extent of outcome-based is program level with long-term success plans. Although here, both B2B partners focus heavily on customer involvement. While differentiators benefit from lead user involvement to develop disruptive technologies and tap into new and existing customer segments, facilitators prefer to use extensive market research to make incremental advances in technology, which is primarily aimed at existing markets. Because B2B partners enjoy sizeable resources, they retain complicated organizational processes as well. This leads to a condition in which being process-based requires a longer time span for the service innovation process. However, differentiators benefit from more modernized and adaptive processes than facilitators. Finally, considering the complexity and time span of the service innovation process, both partners desire a high level of business interactions, which involves different types of formal and transactional business interactions over a secure and highly specific service contract.

5.4. Knowledge-based type

The knowledge-based type involves the role of technology supplier as *differentiator* and service provider as *enabler* in the service innovation process. Our cases reveal that the differentiating role of technology supplier creates a competitive advantage. As a result, the supplier can undertake a diverse range of responsibilities. A differentiator benefits from a high level of technological knowledge and prefers to undertake different responsibilities at both ends of the process. However, an enabler has a limited level of knowledge and prefers to be involved at the front and customer-facing end of the process. In our cases, technological knowledge and size of organizational capabilities offered an advantage to differentiators over enablers. This made the service provider more dependent on the technology supplier. Indeed, our cases show that commitment of the service provider as the enabler helped the technology supplier benefit from its technology in the service innovation process for a more extended period. As a result,

the extent to which the service innovation process was outcome-based was more focused on extensive R&D, which was offered by the differentiator externally. Because technological knowledge creates competitive advantage in this way, the technology supplier can differentiate its technology from that of its competitors and maintain its market advantage for a while. This also requires the adoption of a disruptive market approach. Furthermore, customer involvement is limited while a longer time span is agreed between B2B partners. Due to the level of disruption involved, the extent to which the service innovation process is outcome-based is program level with an objective for success over time. Although organizational processes for a differentiator are more adaptive, the outdated processes for the enabler mean limited activities or the creation of new roles for the extent of being process-based. Finally, because B2B business interactions are more competitive and involve a certain degree of imitation from enablers, differentiators are inclined toward collaborative and relational interactions over a longer period.

6. Conclusion

The service innovation literature focuses extensively on different categorizations of service innovation and highlights the role of employees and customers in the service innovation process (Larivière et al., 2017; Snyder et al., 2016). Scholarly attention is still diverted to established models from the product innovation literature, while the service innovation literature, mainly for B2B firms, remains unexplored (Biemans et al., 2016; Dotzel & Shankar, 2019). In particular, exploring the service innovation process and considering partnerships between key B2B members has been largely overlooked (Biemans & Griffin, 2018; Helkkula et al., 2018; Witell et al., 2017). This is somewhat surprising as key members, including technology suppliers and service providers, play essential roles throughout the service innovation process (Hidalgo & D'Alvano, 2014; Storey et al., 2016).

We respond to Biemans and Griffin's (2018) call for research to design an innovation process model that is based in a service context, benefits B2B partners, and may initially require a qualitative research method. Our findings suggest that B2B members (i.e., technology suppliers and service providers) encounter different challenges and potential opportunities as a result of their partnership in the service innovation process. We further rely on the extant B2B service innovation literature as our sensitizing concepts to develop a typology that highlights two roles for technology suppliers and two roles for service providers. We also identify the extent to which the service innovation process can be outcome- and process-based.

6.1. Theoretical contributions

Our study primarily contributes to the well-established literature on B2B service innovation by extending the understanding of partnerships between B2B firms in the service innovation process. We build on the theoretical base of the service innovation process (Helkkula et al., 2018; Storey et al., 2016; Witell et al., 2017)—in particular, those exploring the involvement of B2B partners and factors governing their behaviors (Biemans et al., 2016; Biemans & Griffin, 2018). Extant service innovation literature highlights that service providers benefit from internal resources and technology development teams when dealing with particular challenges (Gallouj & Savona, 2009; Hidalgo & D'Alvano, 2014). However, technology suppliers are still key sources of technical knowledge due to their understanding of technological requirements of the service innovation process. As a result, they remain the main providers of specialized knowledge and experience in B2B partnerships (i.e., partnerships with different service providers) (Miozzo & Soete, 2001).

While service providers often interact with different external partners (i.e., technology suppliers) to maintain successful B2B collaborations (Helkkula et al., 2018; Hidalgo & Herrera, 2020), we explored B2B partnerships across different ends of the service innovation

process, back and front ends. Moreover, the B2B service innovation literature discusses how incremental changes to the service innovation process may better suit the requirements and experience of individual B2B customers (Dotzel & Shankar, 2019; Helkkula et al., 2018). As our cases indicate, technology suppliers tend to be disruptive and develop technologies that offer competitive advantage, in either a new customer segment or an existing one. However, they often face resistance from service providers and those providers' B2B customers. We explored how this situation affects the type of market approach B2B firms adopt, which helps identify the extent to which B2B partners can engage in radical and incremental changes.

Meanwhile, our cases reveal that B2B partners may benefit from an unfair advantage due to the size and key characteristics of their organizational capabilities and resources. This can create conditions in which technology suppliers have to create a network of contributors, including other technology suppliers, and share their service contract. Indeed, complex service innovation processes are better orchestrated when network of co-producers (e.g., different suppliers) are involved and contribute to the service provider's service innovation processes (Helkkula et al., 2018; Hidalgo & D'Alvano, 2014; Hidalgo & Herrera, 2020).

Finally, technology suppliers, like service providers, may join the service innovation process with different mind-sets. Their business interactions with service providers may turn into collaborative, competitive, transactional, or relational B2B partnerships. They may also engage in limited or comprehensive business interactions with service organizations to maintain their position and ultimate share of profit in the service innovation process (Gallouj et al., 2015; Gallouj & Savona, 2009). We also found that they opt for informal data sharing without contractual commitments in collaborative and relational interactions and more formal and limited data sharing with a service contract in transactional and competitive interactions.

6.2. Managerial implications

We created the service innovation process typology in response to calls from different scholars. Biemans and Griffin (2018) call for new innovation tools to improve the sophistication of service innovation in a B2B service context. Biemans et al. (2016) call for a case study approach that improves our understanding of how firms innovate services and the factors governing their behavior. Finally, Storey et al. (2016) call for new attempts on the "hows and whys" of partnership in a successful service innovation process.

Our managerial implications are threefold, which help managers on both ends of the spectrum to better manage their decisions and activities. First, the service innovation process typology has several implications. (1) Before embarking on the service innovation process journey and committing resources, key B2B partners need to assess different roles and their readiness to commit to a partnership. (2) Before developing and committing to the service innovation process, it is imperative for technology supplier managers to ensure that a service provider's goals and incentives are aligned with those of the technology supplier. (3) Managers can use details provided in the typology as a guideline to better align their ambitions with the reality of what will happen in the service innovation process once they initiate a B2B partnership. (4) Considering the extent to which a service innovation process can be outcome- and process-based, as presented in our typology, can advise mangers whether to invest their scarce resources in any form, including customer big data and/or technological know-how, or to contract it out.

Second, the challenges and potential opportunities that technology suppliers face have a few implications. (1) the exclusion of technology suppliers from service contracts can be a starting point for the emergence of different challenges and potential opportunities in the service innovation process. As a result, service provider managers need to develop a mechanism through which their technology suppliers can, directly or indirectly, benefit from the service

innovation process and service contracts. (2) Technology supplier managers need to note that the diversity of challenges, responsibilities, and potential solutions is considerably broader than the binary choice of being "*fully committed in a chunky contract to transition into a favourite client*" versus being "*partly committed in a business consultancy contract with an easy paycheck.*" Mangers on both sides play an important part in the early identification of emerging challenges and their potential solutions. (3) Managers and advisors can use the challenges and potential opportunities to identify gaps throughout the service innovation process to better align their contributions and recommendations.

Third, on a broader scale, the B2B partnership between technology suppliers and service providers in the service innovation process can happen at the transactional level or at a much deeper relational level, which in turn can change the dynamics of the process. Managers in both parties should understand that at the transactional level, there is limited opportunity for relational development, but there may be repeated transactions. As technology suppliers and service providers continue to explore their partnerships, they may migrate to a deeper level with new terms of relational partnership. This is based on the premise that good relationships facilitate exchange results between B2B partners. Relational benefits can also be critical for keeping both B2B partners loyal, particularly for securing new service contracts. Technology suppliers and service providers need to make realistic promises, including transactional or relational commitments, that enable the completion and success of service innovation processes.

6.3. Limitation and future research directions

Our paper has its limitations. First, although we selected cases from across the service sector to avoid industry-specific findings, the majority of the cases are clustered in the area of software development. This is mainly because such technologies directly affect the forefront

of innovative services and require support at the back end. Second, understanding B2B partnerships between technology suppliers and service providers and the resultant introduction of technologies in the service innovation process is not representative of the whole service sector. Third, because our insights are limited to interviews and case studies in the U.K. service sector, it remains unclear how different characteristics of service innovation in different service contexts might affect the service innovation process.

Future work could continue to shift the spotlight away from the customer-facing functions and customer involvement in the service innovation process and more toward the involvement of B2B partners in different stages of the process, while trying to understand how they leverage their knowledge to maintain their competitive advantage. Further research might also explore the degree of business interactions at a deeper level, particularly the requirements and requisite conditions in which the transactional or relational terms between B2B partners affect the service innovation process. Furthermore, although our study primarily uncovered challenges and potential opportunities, we also shed light on some of the solutions throughout this process. However, offering proper and in-depth solutions to these challenges and potential opportunities is beyond the scope of this paper. Finally, and most importantly, future empirical studies could explore the B2B processes and practices that occur when adopting new technologies, particularly those for technology-based service innovations. Indeed, further research is necessary to guide B2B partners on the adoption of technologies for their technology-based service innovations.

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