

Research paper

The central role of knowledge integration capability in service innovation-based competitive strategy

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A B S T R A C T

This study examines how B2B service firms organize and manage knowledge in order to deliver new value adding solutions and in turn competitive advantage, addressing calls for research into this important, yet neglected area. Specifically, this study: (1) examines the role of the antecedents of knowledge integration capability (KIC) in service innovation-led competitive advantage in project-oriented B2B service firms; and (2) models and empirically tests the links between KIC and service innovation, and in turn sustainable competitive advantage (SCA). Findings from our research of Australian and US project-oriented firms support our central theorization that the new knowledge acquired through external and internal sources per se is not sufficient, but should be integrated with existing knowledge in order to deliver innovative service solutions addressing clients' needs. Results from testing non-linear effects of new knowledge configurations on service innovation provide deeper insights into the suggested relationship. Our research contributes to calls for comprehensive frameworks of service innovation-led competitive advantage. We provide theoretical and managerial implications, and suggest areas for future research.

1. Introduction

With increased fragmentation of markets and more demanding customers, service providers are shifting focus to providing client-focused, innovative solutions designed to deliver greater customer value and sustained competitive advantage (SCA). Caterpillar, Michelin and Rolls-Royce are examples of business-to-business (B2B) firms who understand the importance of client focused innovative solutions (Windler, Jüttner, Michel, Maklan, & Macdonald, 2017). This shift is well recognized in the services literature (c.f. Berry, Shankar, Parish, Cadwallader, & Dotzel, 2006; D'Antone & Santos, 2016; Storey, Raddas, Burton, Zolkiewski, & Baines, 2016).

Scholars are only now starting to examine knowledge resources and mechanisms underlying service innovation-led competitive advantage (e.g., Kang & Kang, 2014; Windler et al., 2017), as knowledge resources are arguably of critical importance to innovation (Zhou & Li, 2012). The growing service innovation research highlights that pathways for service-related knowledge differ from goods-related knowledge (c.f., Höber & Schaarschmidt, 2017; Schaarschmidt, Walsh, & Evanschitzky, 2017). Yet, despite recognition that important differences exist between goods-based firms and service firms, and the heightened interest by both scholars and practitioners alike, how B2B service firms organize and manage knowledge in order to deliver new value adding solutions, and the link to competitive advantage, remains unclear (Storey & Kahn, 2010).

Further, while advancements in the broader service innovation literature provide a useful starting point, prior service innovation literature has largely focused on financial contexts (de Jong & Vermeulen, 2003), highlighting the need for alternative rich contexts (Candi & Kahn, 2016; Ordanini & Parasuraman, 2011). We address calls to develop and test more comprehensive models of service innovation, capturing antecedent factors that drive service innovation in B2B service settings (Bharadwaj, Varadarajan, & Fahy, 1993; Johne & Storey, 1998).

Specifically, we argue that knowledge generation per se is not sufficient, but should be integrated in order to deliver innovative service solutions addressing clients' needs (Leiponen, 2006; Okhuysen & Eisenhardt, 2002). Knowledge integration involves using formal processes and structures that enable the capture and integration of market and other types of knowledge among different functional units within the firm (Olson, Walker, & Ruekert, 1995). Accordingly, using the dynamic capabilities view (Eisenhardt & Martin, 2000; Helfat et al., 2007; Zahra, Sapienza, & Davidsson, 2006), we theorize that the acquisition of new knowledge through external and internal sources stimulates innovative service firms to integrate such knowledge with existing knowledge. In turn, knowledge integration capabilities (KIC) produce new knowledge configurations enhancing a service firm's capacity to deliver innovative service solutions leading to SCA. Project-oriented B2B service firms in particular have been largely neglected, yet they offer an excellent context in which to investigate the central role of

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knowledge integration capability (KIC).

The purpose of this article is thus two-fold, to: (1) examine the antecedents of KIC in generating new knowledge resources in project-oriented service firms; and (2) model and empirically test the links between KIC and service innovation, and in turn, sustainable competitive advantage (SCA).

Our research makes at least four important contributions. First, we demonstrate the important role that client-focused learning and episodic learning activities play in the strategic knowledge development process in project-oriented service firms. Second, we identify the central role of KIC and its interplay with the two learning capabilities in building new knowledge configurations to deliver new and value-adding customer-focused service solutions. Third, expanding on prior work, we examine both linear and non-linear effects of new knowledge configurations on service innovation and service firm sustained competitive advantage. Fourth, we examine the role entrepreneurial managers play in the new knowledge development process leading to service innovation, the importance of which has been increasingly recognized (e.g., Agarwal & Selen, 2009), but insufficiently examined. Overall, we contribute to the need for building empirically tested frameworks of service innovation-led competitive advantage, capturing the unique characteristics of the service context (Alam & Perry, 2002; Bharadwaj et al., 1993; Johnes & Storey, 1998).

Our paper is organized as follows. First, drawing on multiple literature streams, we build our conceptual foundations. Second, we present our conceptual model, theoretical relationships and a set of hypotheses to be tested. Third, we outline our two-stage research design that employs Australian and US project-oriented firms. Fourth, we report the results of the study followed by a discussion on the implications of the findings for both theory and practice. Finally, limitations and future research directions are discussed.

2. Conceptual foundations

2.1. Knowledge generation, integration and innovation

The role of accumulating and integrating of knowledge resources in firm innovation has received considerable attention in the innovation literature. The importance of internal (Almeida, Song, & Grant, 2002; Brown & Eisenhardt, 1997; Menon & Pfeffer, 2003) and external sources (Argote, 1999; Leonard-Barton, 1992; Moorman & Miner, 1997) of learning have been emphasized. Both sources of learning complement each other and can be important precursors to innovation (Hartman, Tower, & Sebor, 1994) and firm performance (Bierly & Chakrabarti, 1996; Roth & Jackson III, 1995). In particular, in project environments, knowledge integration capability enables the firm to combine various production inputs such as skills, knowledge, software and technology to produce successful project outcomes (Davies & Hobday, 2005). Innovation requires diverse resource inputs (Kanter, 1988) with synergistic benefits of knowledge resource combinations being more likely when based on resource complementarity rather than resource similarity (c.f. Wiklund & Shepherd, 2009; Harrison, Hitt, & Hoskisson, 2001) and pronounced in dynamic environments (Song, Droge, Hanvanich, & Calantone, 2005). Technological and market knowledge resources are two most commonly cited (Kogut & Zander, 1992; Shane, 2000) with emphasis on their integration in the firm's learning processes to achieve innovation and performance (Song et al., 2005).

Specifically, knowledge integration has been linked to a firm's strategic advantage. The manner in which the firm integrates its knowledge resources is a key element of its competitive strategy (Narayanan, Yang, & Zahra, 2009). New combinations are embedded in newly formed “routines” that represent new repetitive “ways of combining” (Nelson & Winter, 1982). The implications of this activity on competitive strategy are two-fold. First, superior knowledge combinations create greater value-adding innovations enabling the firm to gain

market advantages over their rivals. Second, new combinations, embedded in difficult-to-imitate routines, ensure that the competitive advantages gained cannot be matched easily by competitors (McGrath, Tsai, Venkataraman, & MacMillan, 1996).

2.2. The project-oriented firm context

Integration of knowledge resources is particularly relevant to project-oriented service firms as they are task-oriented, adaptable and flexible and aimed at providing specific services to clients (Acha, Gann, & Salter, 2005). Project activities and outcomes are unique and customer centric (Davies & Hobday, 2005). They are characterized by relatively long project life cycles during which strong client relationships are built and nurtured. We define a project-oriented service firm as “a service firm skilled at organizing tasks around projects in anticipation and response to client requirements and in which the needs of the project outweigh other considerations in the firm's decision making” (Blindenbach-Driessen & van den Ende, 2006; Salunke, Weerawardena, & McColl-Kennedy, 2011). These firms produce complex solutions for their clients (De Brentani & Ragot, 1996) which usually involves the integration of products or systems, such as IT systems, delivered in a B2B environment (Blindenbach-Driessen & van den Ende, 2006). Sustainability of their competitive edge is deeply rooted in the complexities of the knowledge integration process. These complexities are not easy to imitate (Whitley, 2006), and are therefore used by project-oriented service firms as a strategic lever in the competitive strategy process (Gann & Salter, 1998; Hitt, Bierman, Shimizu, & Kochhar, 2001).

In developing new and effective solutions, project-oriented firms must first orchestrate resources that align with the problems presented by clients. This requires superior client-focused knowledge (Sawhney, 2006) with client contributors (Mills & Morris, 1986). Further, integration across functions to link operational capabilities with the changing demands of the business environment is critical in developing new offerings (Turkulainen, Kujala, Artto, & Hewitt, 2013). Although multiple project forms may be the best vehicle to effectively deliver these service solutions (Pennypacker & Dye, 2002), developing such unique resource combinations each time may hinder “economies of repetition” (Davies & Brady, 2000), eroding the firm's cost base and jeopardizing long-term competitive advantage (Engwall & Jerbrant, 2003). However, as projects by nature are episodic, project-oriented firms have the opportunity to transpose the knowledge gained from one project to other projects (Blazevic, Lievens, & Klein, 2003), thus achieving synergies. This “knowledge brokering” capability (that is, to use “old knowledge as raw material for new knowledge” (Hargadon, 2002, p. 43)), enables them to incorporate new knowledge in a sustained manner into new client/customer-focused solutions (Davies & Brady, 2000). Clearly, such integration mechanisms that bring together project and service business knowledge is critical to develop comprehensive solutions (Artto, Valtakoski, & Kärki, 2015).

2.3. Dynamic capabilities and new knowledge development

The primary task of dynamic capabilities in the competitive strategy process is to transform the organization's knowledge resources and operational routines (Cepeda & Vera, 2007; Eisenhardt & Martin, 2000). New resource combinations enable the organization to pursue its primary value creating strategy through ability to change the way the organization solves problems and addressing change or anticipated change of problems (Zahra et al., 2006). Therefore, the dynamic capabilities view provides a sound theoretical foundation for our enquiry. Accordingly, we argue that dynamic capabilities, by making new knowledge resource configurations available, enable project-oriented firm to pursue innovative client focused new solutions and in turn gain competitive advantage. Sustained competitive advantage (SCA) refers to the firm's ability to achieve a superior marketplace position. This reflects the capture of superior customer/client value and/or the

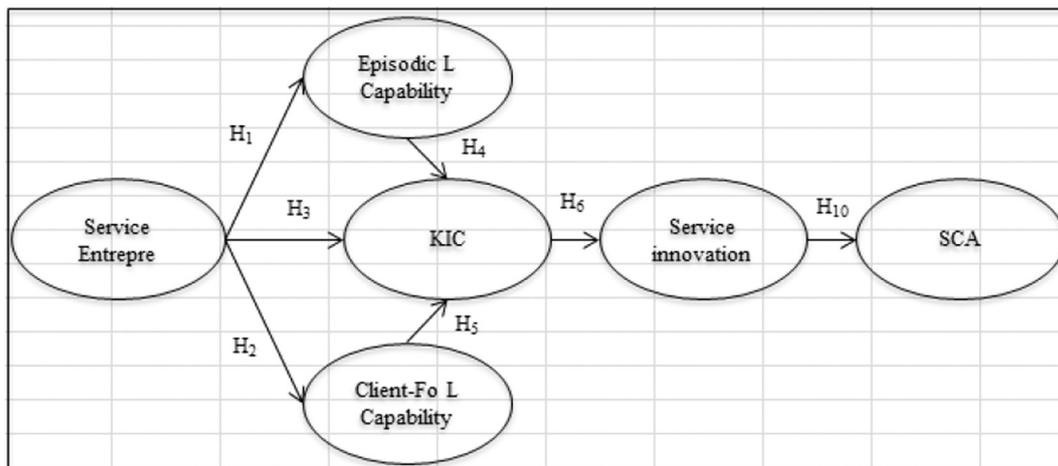


Fig. 1. Conceptual model.

achievement of lower relative costs, which result in market share dominance and superior financial performance (Hunt & Morgan, 1995). While some progress has been made, much remains to be done, especially in establishing links between knowledge integration capability in service innovation and sustainable competitive advantage. Salunke et al. (2011) in their exploratory study, proposed a model of the antecedents of the knowledge integration process in service innovation-based competitive advantage. While their study is helpful in providing preliminary evidence, an empirical test of the model is required.

3. Conceptual model and hypotheses development

Accordingly, we test Salunke et al. (2011)'s model in two countries. Our conceptual model is presented in Fig. 1. The model posits that project-oriented service firms pursuing innovation-led competitive advantage build and nurture dynamic capabilities in (1) episodic learning, (2) client-focused learning and (3) knowledge integration. The first two capabilities represent new knowledge generated through internal and external sources. This knowledge integration capability (KIC) reflects the business service firm's capacity to develop new knowledge configurations by integrating new knowledge with existing knowledge. We argue that the presence of knowledge acquired through externally-focused and internally-focused learning capabilities, is a *necessary* but not a *sufficient* condition for service innovation to occur. Such capabilities should be complemented with the knowledge integration capability enabling the firm to develop new and value enhancing service solutions addressing client/customer requirements. The presence of entrepreneurial key decision-makers is a prerequisite for this process. The key constructs and hypotheses are introduced next.

3.1. Service entrepreneurship (SE)

Entrepreneurship refers to a firm's ability to drive change, innovate and rapidly react to environmental changes in order to exploit emerging opportunities (Naman & Slevin, 1993) and is linked to new product introduction and superior market-based performance (Sarkar, Echambadi, & Harrison, 2001). The behavioral approach to entrepreneurship that has been predominantly adopted in product innovation literature conceptualizes entrepreneurship as a manifestation of firm behavior (e.g., Covin & Slevin, 1991a, 1991b) and uses the dimensions of *innovativeness*, *proactiveness* and *risk-taking* (Covin & Slevin, 1991a, 1991b). As argued by Salunke et al. (2011); Salunke, Weerawardena, and McColl-Kennedy (2013), this approach is inadequate to capture the unique operational characteristics in service firms, in particular, the flexibility needed for greater interaction with clients in the delivery of solutions. They propose the additional

dimension of *adaptiveness* to strengthen the behavioral entrepreneurship construct which represents the firm's receptiveness to the client's requirements as well as their readiness to customize the service offering (Bettencourt & Gwinner, 1996). We build on and extend Salunke et al.'s (2013) operationalization of service entrepreneurship in terms of four dimensions, namely: *innovativeness*, *proactiveness*, *risk-taking*, and *adaptiveness*.

3.2. Service entrepreneurship and dynamic capabilities

The dynamic capabilities view recognizes the critical role of entrepreneurial key decision-makers in building prerequisites for competitive advantage (e.g., Teece, Pisano, & Shuen, 1997; Zahra et al., 2006). Dynamic capabilities do not merely happen by chance or as a result of a good firm-business environment fit, but are developed purposefully by the strategic choices and actions of the organization's managers (Grant, 1991; Lado, Boyd, & Wright, 1992).

3.3. Episodic learning capability

Drawing on the dynamic capabilities literature (Helfat et al., 2007), we define episodic learning capability as a project-oriented firm's capacity to purposefully create new knowledge from its past project experience(s), extend such knowledge to value creating activities and modify such knowledge to address changing market conditions. With the traditional model of technological development through a central R & D (research and development) unit being less than adequate for project-based environments, episodic learning becomes a key source through which the firm can achieve cost-efficiencies in multiple project settings (Acha et al., 2005). Episodic learning leads to innovation (e.g., MacCormack, Verganti, & Iansiti, 2001). Project-oriented firms draw lessons from particular episodes of innovation into an overall strategy to ensure project-to-project, project-to-business and business-to-project knowledge exchange (Acha et al., 2005). These meta-routines - "patterns of behavior that form the organization's procedural mind" (Acha et al., 2005, p. 280) - for the capture of learning and innovation are not automatic behaviors but rather are an organizational response in the form of policies and processes of human resource management, knowledge management and R&D (Acha et al., 2005). Thus:

H₁. In project-oriented firms, service entrepreneurship is positively related to episodic learning capability.

3.4. Client-focused learning capability

Client-focused learning capability is defined as the project-oriented

firm's capacity to purposefully create new knowledge from its direct and indirect interactions with clients, extend such knowledge to value creating activities, and modify such knowledge to address changing market conditions. Firms are increasingly adopting a customer-oriented perspective as a source of competitive advantage by integrating service offerings into business customer processes (Matthyssens & Vandenbempt, 2008). This requires continuous reinvestment in customer learning and customer services, and advanced technology (e.g., digitization) in creating customer process-oriented pathways (Coreynen, Matthyssens, & Van Bockhaven, 2017). Prior research has highlighted the importance of learning from customers/clients for superior value creation (Slater & Narver, 1995). Having a greater understanding of customers is a precursor to developing service offerings desired by customers (Paiola, Saccani, Perona, & Gebauer, 2013; Storey, Cankurtaran, Papastathopoulou, & Hultink, 2016; Ulaga & Reinartz, 2011) and a risk-mitigation capability (Cova & Salle, 2007; Ulaga & Reinartz, 2011). It is a prerequisite for shifting from products to solutions (Paiola et al., 2013) and building effective relationships with customers (Neu & Brown, 2005). Considering the emphasis placed on the customer/client input in service innovation (Alam & Perry, 2002), we thus argue that client-focused learning is a critical capability in the innovation process. Hence:

H₂. In project-oriented firms, service entrepreneurship is positively related to client-focused learning capability.

3.5. Knowledge integration capability (KIC)

The knowledge-based view of the firm holds that *knowledge generation and application* are key activities underlying superior firm performance (Leiponen, 2006; Nonaka, 1994; Taylor & Greve, 2006). The former enables firms to build knowledge assets by tapping into outside-in and internal knowledge flows; the latter enables firms to embed knowledge into its service offerings. The extent to which firms successfully engage in these activities depends on management's role in developing and deploying distinctive capabilities (c.f., Decarolis & Deeds, 1999) for fit for purpose knowledge assets. The concept of higher-order integration capabilities (Fuchs, Mifflin, Miller, & Whitney, 2000; Lawson & Samson, 2001) represents the ability to manage multiple distinctive capabilities related to knowledge generation and application (Agarwal & Selen, 2009).

Knowledge integration capability (KIC) represents a firm's capacity to synthesize and apply current and acquired knowledge in the pursuit of business opportunities. In the current research, KIC is defined as the project-oriented firm's capacity to purposefully create new knowledge from a combination of knowledge resources, extend such knowledge to value creating activities and modify such knowledge to address the changing market conditions (Kogut & Zander, 1992). It involves integrating knowledge acquired through episodic learning (internally-focused) and being client-focused (externally-focused). Both these knowledge sources are prerequisites for innovation. New combinations embedded in difficult-to-imitate knowledge routines ensure that the competitive advantages gained cannot be matched easily by competitors (Bharadwaj et al., 1993; McGrath et al., 1996; Storey & Kahn, 2010). Entrepreneurial initiatives underlie this process (Grant, 1991; Lado et al., 1992). Thus:

H₃. In project-oriented firms, service entrepreneurship is positively related to KIC.

3.6. Interplay of knowledge acquisition and integration capabilities

The key role of KIC in a firm's innovation process is to ensure that the required new knowledge combinations are made available to the firm's entrepreneurial managers. For this to occur, the knowledge acquired through externally-focused and internally-focused sources must

be present within the firm. However, the new knowledge acquired by the firm may not necessarily fit with existing knowledge which needs to be assimilated with existing knowledge (Cohen & Levinthal, 1990). Similarly, the acquired knowledge in its original form may not be readily useful in addressing customer needs which may vary across different projects (Grant, 1996; Kogut & Zander, 1992). Therefore, the acquisition of new knowledge in the context of developing customer-focused solutions must logically lead to knowledge integration. In a project-oriented firm setting the firm's client-focused learning capability and episodic learning capability represent the two sources of learning, respectively. Therefore, we argue that having a greater episodic and client-focused knowledge stimulates the service firm to integrate such knowledge to deliver new and value-adding client-focused service solutions. Thus it is hypothesized that:

H₄. In project-oriented firms, episodic learning capability is positively related to KIC.

H₅. In project-oriented firms, client-focused learning capability is positively related to KIC.

3.7. Service innovation

Innovation accelerates growth and profitability in service firms, contributing to value creation in novel ways both for firms and their customers (Moller, Rajala, & Westerlund, 2008). The two major theoretical perspectives in service innovation research, namely, the demarcation and synthesizing approach, both recognize and emphasize the specificity of services vis-à-vis goods in new value creation (c.f., Gallouj & Savona, 2009; Witell, Snyder, Gustafsson, Fombelle, & Kristensson, 2016). Accordingly, the focus of prior service innovation research has primarily been on making theoretical advancements in the field [e.g., service innovation dimensionality (Agarwal & Selen, 2011; Den Hertog, Wietze, & De Jong, 2010; Edvardsson & Olsson, 1996), characteristics (type, degree, newness) (Gallouj & Weinstein, 1997; Hipp & Grupp, 2005; Johnes & Storey, 1998)] with a focus on the relational aspect in services. The emergent service-dominant (S-D) logic conceptualizes service innovation as a “process of application of specialized competencies (knowledge and skills)” (Vargo & Lusch, 2004, p. 2) achieved through activation of sets of resources, with customer centrality at its heart and new value embedded within service systems (Edvardsson & Tronvoll, 2013).

Given this shift towards customer centricity, it is surprising that there is little understanding, particularly in B2B services contexts, of the manner in which service firms create value *for themselves and their beneficiaries* through innovation. Emerging empirical work emphasizes the importance of this aspect and captures how new value creates benefits for the end user, in addition to the service provider. For instance, the work by Toivonen and Tuominen (2009, p. 893) in the construction services and knowledge-intensive business services, highlights that service innovation ‘benefits the organization that has developed it’ and is ‘derived from the added value provided to its customer’ (emphasis added). Similarly, Salunke et al. (2011, 2013) define service innovation as service offerings that ‘directly or indirectly result in value for the firms and its customers/clients’. These studies make a connection between value provision and value consumption, thus providing a holistic understanding of innovation business services context. Consistent with this approach, we define service innovation as the ‘*introduction and establishment of any new initiative(s) in the provision of services, either conceived internally or adapted from external sources; which directly or indirectly adds new value not only for the firm, but also provides novel solutions or value added to its clients. The changes may range from incremental to radical and may be dominant either at the service consumption interface (frontstage) or at the service provision interface (backstage), the latter usually supporting the former.*

Our definition highlights several important aspects within service

innovation: it connects the ‘introduction’ of service ideas with ‘establishment’ of those ideas, thereby highlighting the importance of operationalizing and not merely creating new service concepts. This is important given the service innovation literature suggests that unlike manufacturing innovation, which is resource intensive, service innovation is less resource intensive and thereby perceived as easy (Kelly & Storey, 2000). Our definition links the new service concept at the frontstage with the backstage support through internal processes and configuration of resources (i.e., the service system) - introduction of new service concepts without a corresponding support resource base is unlikely to create new value. That service innovation involves value creation both for the firm and the customer is consistent with the duality of value creation within a customer-centric paradigm (Shah, Rust, Parasuraman, Staelin, & Day, 2006). It also brings together the concepts of value provision on the one hand and value consumption on the other hand – thereby acknowledging the importance of realized value (as opposed to potential value) in service innovation. Finally, the idea that innovation can be sourced internally or externally is consistent with our knowledge-based framework.

3.8. Knowledge integration and service innovation

As theorized, KIC enables the service firm to deliver client-focused solutions by integrating acquired new and complementary knowledge with existing knowledge. In a study of Finnish business service firms, Leiponen (2006) found significant association between knowledge and service innovation highlighting the need to integrate different knowledge resources within the firm. Innovation results from the ability to integrate different types of existing knowledge bases into new product–market configurations to match those opportunities (Clark & Fujimoto, 1991; Kogut & Zander, 1992; Storey & Kahn, 2010; Van den Bosch, Volberda, & de Boer, 1999). As noted earlier, the synergistic benefits from knowledge combinations are more likely when based on resource complementarity rather than resource similarity (Harrison et al., 2001; Wiklund & Shepherd, 2009). The firm's innovation output is nested within knowledge integrating mechanisms which enables the firm to capture, interpret and deploy its knowledge resources and bases (Verona, 1999). Knowledge integration is linked to the radicalness of the innovation (Ordanini & Parasuraman, 2011) and its marketplace success depends on specific configurations of the new service attributes, with an emphasis on user participation (Ordanini, Parasuraman, & Rubera, 2013). We therefore hypothesize:

H₆. In project-oriented firms, KIC is positively related to service innovation.

Most empirical studies that have examined knowledge integration have hypothesized a linear relationship between knowledge integration and performance (e.g., De Luca & Atuahene-Gima, 2007; Ordanini & Parasuraman, 2011), paying little attention to possible non-linear and atrophy effects of integration on service innovation. As a result, the nature of this relationship has remained largely unexplored. Service innovations are characterized by an absence of patent protection (John & Storey, 1998) and are therefore vulnerable to competitive imitation which coupled with changing market needs necessitates greater effort towards organizational learning to avoid “the tyranny of the served markets” (Hamel & Prahalad, 1994). The capability-rigidity paradox (Leonard-Barton, 1992) suggests the firm's continued investments in and reliance on existing organizational knowledge cause capability-rigidity effects (Leonard-Barton, 1992) or competency trap (Levinthal & March, 1993) leading to diminishing returns.

Further, the dynamic capabilities literature suggests differential effects of a capability over its life cycle (Helfat & Peteraf, 2003). On one hand, greater levels of KIC may mean consolidation and maturation of

the capability, and better innovation outcomes. On the other hand, greater levels of capability resulting in stable innovation outcomes might result in atrophy or weakening of the capability with below optimal innovation outcomes (Zahra et al., 2006). For firms possessing greater integration capabilities, there will be a weaker relationship between KIC and service innovation. We therefore hypothesize:

H₇. In project-oriented firms, the positive effect of KIC on service innovation will diminish (but still be positive) as knowledge integration increases.

3.9. Mediation of knowledge acquisition and service innovation

The presence of new knowledge may be necessary but not be sufficient to pursue customer-focused service solutions. To produce such innovations consistently, firms deploy integrative mechanisms to recombine knowledge stocks (e.g., information, knowhow acquired through internal and external learning) into innovative applications geared towards new market opportunities (Kogut & Zander, 1992). Given the limited attention that the mediating view of knowledge integration has received (De Luca & Atuahene-Gima, 2007), we argue that the acquired new knowledge requires integration for the development of new knowledge configurations for the delivery of client-focused service solutions. Thus:

H₈. In project-oriented firms, KIC mediates the effect of episodic learning on service innovation.

H₉. In project-oriented firms, KIC mediates the effect of client-focused learning on service innovation.

3.10. Sustained competitive advantage (SCA)

Sustained competitive advantage refers to the firm's ability to achieve a superior marketplace position. We adopt Barney's (1991, p. 102) definition of SCA: “A firm is said to have SCA when it is implementing a value-creating strategy not simultaneously being implemented by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy.” Customer focused solutions development involves building operational linkages and extensive information exchanges (Day, 2000; Morgan & Hunt, 1999), leading to long-term collaborative relationships with clients. The high-switching costs involved in these relationships create an inimitability barrier to competitors providing greater scope for SCA. Combinations of knowledge resources are particularly relevant to project-oriented service firms as they are task-oriented, adaptable and flexible, and aimed at providing specific services to clients (Acha et al., 2005). These firms produce complex solutions for their clients that usually involve the integration of many knowledge resources (Blindenbach-Driessen & van den Ende, 2006). Sustainability of a competitive edge for project-based firms is therefore deeply rooted in the complexities involved in the knowledge integration process (Gann & Salter, 1998; Whitley, 2006). Hence:

H₁₀. In project-oriented firms, service innovation is positively related to SCA.

4. Methodology

We adopted a 2-stage research design to test our hypotheses. First, the conceptual framework was tested using a sample of Australian project-oriented service firms allowing us to test new measures for the proposed constructs. Second, the model and measures were validated in

a sample of US project-oriented firms. This sampling strategy provides a meaningful comparison as both are developed economies with thriving service sectors.

4.1. Study 1 and Study 2

Study 1 surveyed senior managers of Australian project-oriented business service firms as respondents and had a three-step mail contact procedure which included two follow-up mail-outs sent as reminders. Of the project-oriented business service firms matching the selection criteria that were contacted, 192 usable surveys were obtained, representing a response rate of over 10%. The most common types of firms in the Australian sample were the ones that offer building and construction services (48%), followed by architectural, engineering and design services (28%). The average firm age was 31 years and respondents had been associated with their firm for approximately 17 years. Study 2 was a validation study where a sample of US project-oriented was obtained through a professional market research company. The respondents comprised an online panel of senior managers. A total of 261 usable responses were obtained with a corresponding response rate of over 20%. The most common types of organizations in the US sample were firms that offer: healthcare services (20%); education services (13%); professional, scientific and technical services (10%); and telecom, financial and construction services (6% each). The average age of firms was 39 years with each respondent being associated with the firm for approximately 10 years. In the Australian sample, approximately 70% of the firms employed 100 employees or less corresponding to a figure of about 48% for US firms. The exploratory (Australian study; $N = 192$) and confirmatory study (US study; $N = 261$) samples were of sufficient size to achieve a high level of statistical power (McQuitty, 2004).

Early respondents were compared with late respondents to assess potential non-response bias (Armstrong & Overton, 1977). A series of Mann-Whitney U tests were conducted between the groups using demographic and non-demographic variables, revealing no significant differences indicating that non-response bias was not a problem in the current study.

4.2. Common method variance

Care was taken in preparing the survey instrument to control for potential sources/effects of common method variance. The measures were constructed from different sources, including academic literature and qualitative case interviews with senior managers performing varying roles. The responses were anonymous and the items were separated and mixed. Following established procedures we used expert panels to remove item ambiguity and easy comprehension (c.f. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

A *post-hoc* factor analysis (Harman's single-factor test) was performed to check for common method bias. Using exploratory factor analysis (EFA) the unrotated factor solution of all the variables in the study was examined. Accordingly, if common method variance is an issue: (a) the factor analysis will yield a single factor, or (b) the majority of the covariance among the measures will be explained by one general factor (c.f. Podsakoff et al., 2003). The EFA revealed the presence of ten distinct factors with eigenvalues > 1 among the seven measures. While the results do not preclude the possibility of common method variance they do suggest that it is not a likely explanation.

4.3. Pre-test

To test for equivalence, a two-part procedure recommended by Mullen (1995) was employed. Following established practice, prior to the survey the instrument was checked for face validity and calibration

equivalence (c.f. Ngo & O'Casey, 2011) on a small sample of respondents. Metric equivalence was then verified using multi-group analysis (Byrne, 2010). Tests for measurement and structural invariance indicate the equivalence of the measures and the structural paths across both samples.

4.4. Measures

Measures used in the study are drawn from existing scales and modified using the findings of our qualitative study. (See Appendix 1 which provides the battery of items).

Service entrepreneurship (SE) We employed Salunke et al.'s (2013) measure as it addresses the inadequacies of the conventional firm-level behavioral entrepreneurship measure (Covin & Slevin, 1991a, 1991b). SE is an aggregate measure of four dimensions - the first three being *proactiveness*, *innovativeness* and *risk-taking* (Covin & Slevin, 1991a, 1991b), and the fourth being *adaptiveness* (Gwinner, Bitner, Brown, & Kumar, 2005) - to capture the firm's tendency to adopt a client-focused posture. SE was assessed using a semantic differential type scale.

4.4.1. Dynamic capabilities

The dynamic capability constructs were operationalized using the conceptualization proposed by Helfat et al. (2007). Each dynamic capability construct comprised six items capturing the three transformational activities; that is, *create*, *extend* and *modify* (two items representing each of the activities). The items were sourced from interviews with key respondents and from the literature: *client-focused learning capability* (Day, 1994; Sawhney, 2006), *episodic learning capability* (e.g., Blazevic et al., 2003), and *KIC* (e.g., Galunic & Rodan, 1998; Von Hippel, 1989). Each dynamic capability construct was assessed on a five-point Likert scale (anchored by "Not at All" and "A Great Deal" at the endpoints).

4.4.2. Service innovation

We adapted the service innovation measure by Salunke et al. (2013) which conceptualizes service innovation in terms of *interactive* and *supportive* dimensions. Service innovation was assessed as a composite measure using a Likert-type scale comprising 4 items for each of the innovation dimensions (anchored by "Remain Unchanged" and "Have Changed Completely" at the endpoints).

4.4.3. Sustained competitive advantage

SCA was operationalized using four items derived from our qualitative study and based on Bharadwaj et al.'s (1993) and Barney's (1991) work which is premised on the inability of competitors to duplicate the benefits of the innovation strategy. SCA was assessed using a Likert-type scale (anchored by "Strongly Disagree" and "Strongly Agree" at the endpoints).

5. Results

In line with previous studies on innovation (e.g., Kortmann, 2014; McNally & Akdeniz, 2011), we used partial least squares in structural equation modeling (PLS-SEM) (e.g. Hair, Ringle, & Sarstedt, 2011). The dimensionality of each construct was assessed using EFA with oblimin rotation. The analysis support unidimensionality for the latent constructs. Summary statistics are provided in Table 1 for the Australian and US samples respectively.

As shown Table 1, the measures demonstrate satisfactory reliability and validity estimates. The factor loadings for all constructs were acceptable (> 0.6) as were the Cronbach's alpha and composite reliability estimates (> 0.7), indicating high levels of construct reliability. The Average Variance Extracted (AVE) for all measures exceeded 50%, demonstrating adequate internal stability and convergent validity (c.f.

Table 1
Summary statistics for linear effects (Australian & US sample).

Construct	Items in scale	Mean	S.D.	AVE	Cronbach's alpha	(a)	(b)	(c)	(d)	(e)	(f)	Parameter estimates	
Service entrepreneurship	(a)	4	3.3	0.72	0.55	0.73	0.55					0.68–0.77	
			(3.6)	(0.75)	(0.54)	(0.70)	(0.52)					(0.66–0.76)	
Episodic L Capability	(b)	6	3.6	0.72	0.73	0.93	0.15	0.73				0.83–0.87	
			(3.8)	(0.72)	(0.60)	(0.90)	(0.19)	(0.62)				(0.69–0.84)	
Client-focused L Capability	(c)	6	3.6	0.79	0.67	0.91	0.28	0.24	0.69			0.75–0.87	
			(3.8)	(0.78)	(0.63)	(0.88)	(0.21)	(0.47)	(0.63)			(0.69–0.81)	
KIC	(d)	6	3.2	0.71	0.53	0.86	0.38	0.29	0.36	0.60		0.73–0.83	
			(3.5)	(0.79)	(0.58)	(0.84)	(0.22)	(0.45)	(0.46)	(0.55)		(0.65–0.80)	
Service innovation	(e)	8	3.2	0.70	0.58	0.90	0.24	0.08	0.18	0.24	0.58	0.73–0.81	
			(3.3)	(0.77)	(0.54)	(0.88)	(0.15)	(0.24)	(0.34)	(0.34)	(0.54)	(0.70–0.78)	
SCA	(f)	4	3.5	0.86	0.73	0.88	0.28	0.08	0.14	0.22	0.31	0.83–0.88	
			(3.6)	(0.82)	(0.68)	(0.84)	(0.27)	(0.33)	(0.31)	(0.37)	(0.26)	(0.68)	(0.80–0.85)

N=192 for AU sample; N=261 for US sample. Values in the shaded diagonal represent the average variance extracted (AVE) for each construct. The squares of the correlation estimates are presented in the lower triangle of the matrix. The squared correlation estimate should be lower than the AVE for discriminant validity to be established between two constructs; S.D. – Standard deviation; CR – Composite reliability. Please note: Summary statistics for the US sample in parenthesis below and highlighted in bold

N = 192 for AU sample; N = 261 for US sample. Values in the shaded diagonal represent the average variance extracted (AVE) for each construct. The squares of the correlation estimates are presented in the lower triangle of the matrix. The squared correlation estimate should be lower than the AVE for discriminant validity to be established between two constructs; S.D. – Standard deviation; CR – Composite reliability. Please note: Summary statistics for the US sample in parenthesis below and highlighted in bold.

Hair, Black, Babin, & Anderson, 2014). Discriminant validity was assessed using Fornell and Larcker's (1981) test using construct pairs. Accordingly, the variance extracted estimated for any two constructs was compared with the square of the correlation estimate between these two constructs. For discriminant validity to be established the squared correlation estimates have to be lower than the variance extracted estimates for each construct (Fornell & Larcker, 1981). Our results support distinction of the constructs included in the model (Table 1).

The results of hypotheses testing are presented in Table 2. The standardized path coefficients between the latent constructs in the model are shown in Figs. 2 and 3 for the Australian and US sample respectively, with the associated p-values in the parentheses.

As hypothesized (Table 2), for both samples there are significant positive relationships between service entrepreneurship and the dynamic learning capabilities, that is, episodic learning capability [H₁: β_{Aus} = 0.38 (p < 0.001); β_{US} = 0.44 (p < 0.001)] and client-focused learning capability [H₂: β_{Aus} = 0.53 (p < 0.001); β_{US} = 0.46 (p < 0.001)]. Likewise, the hypothesized path between service entrepreneurship and KIC (H₃) is supported for both samples [H₃: β_{Aus} = 0.38 (p < 0.001); β_{US} = 0.14 (p < 0.01)]. There are significant positive relationships between dynamic learning capabilities and KIC, that is, episodic learning → KIC [H₄: β_{Aus} = 0.26 (p < 0.001); β_{US} = 0.35 (p < 0.001)] and client-focused learning → KIC [H₅: β_{Aus} = 0.27 (p < 0.001); β_{US} = 0.37 (p < 0.001)]. The results suggest a significant positive relationship between KIC and service innovation, that is, KIC → service innovation [H₆: β_{Aus} = 0.49 (p < 0.001); H₆: β_{US} = 0.59 (p < 0.001)].

In addition to the linear effect, we tested for the quadratic effect of KIC on innovation for both samples (using orthogonalization method) to examine its performance on service innovation over time. The testing reveals complex, but interesting results. For the Australian sample, the quadratic effect of KIC on innovation is significant and negative (β_{Aus} = -0.16 (p < 0.1). This means that the positive effect of KIC, as measured by the generation, extension and modification of innovation-related knowledge resources, declines over time in an inverted U-shape manner, suggesting the positive effect of KIC on innovation diminishes beyond a certain point. The quadratic effect of KIC on service innovation in the US sample is, however, statistically non-significant

{β_{US} = -0.21 (p = 0.359)}, suggesting that the effect of KIC on service innovation in the US context remains linear and continues unabated.

5.1. Mediation tests

We conducted a Sobel test (Baron & Kenny, 1986) to test the mediating effect of KIC on the relationship between the dynamic learning capabilities and service innovation. The Sobel test confirms a positive mediation effect as the regression coefficients significantly decrease when the knowledge integration mediator variable is included (Appendix 2). As indicated, with the exception of the EL → KI → SI (Australian sample) model, partial mediation is supported for all the other tested relationships [H_{8US}; H_{9Aus}; H_{9US}]. KIC fully mediates the relationship between episodic learning and service innovation in the Australian model [H_{8Aus}] (Appendix 2).

5.2. Model fit

The model fit was assessed by examining the model fit indices in PLS, using the average path coefficient (APC), average R-squared (ARS), and average variance inflation factor (AVIF). The fit indices for the two samples, Australian sample [APC = 0.377 (p < 0.001); ARS = 0.371 (p < 0.001); AVIF = 1.802] and US sample [APC = 0.377 (p < 0.001); ARS = 0.371 (p < 0.001); AVIF = 1.872], are well within those recommended by Kock (2013) {i.e., p-values < 0.05 for APC and ARS; AVIF ≤ 5, ideally ≤ 3.3}, thereby indicating a good fit of the models to the data. VIF values for the two samples [VIF_{Aus} = 2.183; VIF_{US} = 2.269] (< 2.3) also suggest that multicollinearity was not an issue (Hair et al., 2014). Additionally, we computed the Goodness of Fit (GOF) index (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005) that simultaneously assesses the fit of the outer measurement and inner-structural models in PLS. For both samples the GOF [Australian sample = 0.486; US sample = 0.469] indicates large effect sizes (c.f. Wetzels, Odekerken-Schroder, & van Oppen, 2009), suggesting a robust fit of the model to the data. Finally, we assessed the predictive relevance of the model using the Stone-Geisser Q² coefficient (c.f. Ruiz, Gremler, Washburn, & Carrion, 2010) - a nonparametric measure that represents how well the observed values are reconstructed by the model and the model parameters. The coefficients for all endogenous variables

Table 2
Hypotheses tested.

	Australia	United States
H ₁ : Service entrepreneurship → Episodic L capability	Supported	Supported
H ₂ : Service entrepreneurship → Client-focused L capability	Supported	Supported
H ₃ : Service entrepreneurship → KIC	Supported	Supported
H ₄ : Episodic L Capability → KIC	Supported	Supported
H ₅ : Client-focused L Capability → KIC	Supported	Supported
H ₆ : KIC → Service innovation	Supported	Supported
H ₇ : KIC ² → Service innovation (quadratic effect hypothesis) (-)	Supported	Not supported
H ₈ : Episodic L → KIC → service innovation (mediation hypothesis)	Full mediation supported	Partial mediation supported
H ₉ : Client-focused learning → KIC → service innovation (mediation hypothesis)	Partial mediation supported	Partial mediation supported
H ₁₀ : Service innovation → SCA	Supported	Supported

in both models are greater than zero, suggesting acceptable predictive validity. Overall, the model explained 31% of the variance in the SCA construct in the Australian sample and 29% of the variance in the US sample.

6. Discussion

Our study examines the interplay of knowledge acquisition capabilities and KIC in the delivery of solution-focused service innovation and in turn on SCA. We were motivated by calls for studies examining in depth the acquisition and integration of knowledge resources underlying service innovation-led competitive advantage in service firms (c.f. Zahra, 2015). In a departure from past studies that have been primarily undertaken in financial service settings, we adopt the project-oriented service firm context because of its appropriateness to address our focal research goals. The results of the study, while broadly supporting the hypothesized relationships, highlight the complexities involved with knowledge integration activities preceding service innovation-based competitive advantage.

Service entrepreneurship emerges as the primary driver of the service innovation-based competitive strategy process. While the role of managers in service innovation has been increasingly recognized

(Agarwal & Selen, 2009), the entrepreneurial dynamics underpinning the design and delivery of new value-adding solutions has received limited attention. Our finding that entrepreneurship is a key driver of knowledge creation and integration responds to calls by Zahra (2015, p. 733) who highlights the need for the recognition of entrepreneurship as a ‘knowledge creation and conversion process’ that drives renewal within organizations. Furthermore, the operationalization of service entrepreneurship construct (with the added adaptiveness dimension) lends credence to Storey, Cankurtaran, et al. (2016)’s assertion that for services that need interpersonal interactions and tacit knowledge exchange (i.e., the focal context in this study), managers should build an innovation strategy around responsiveness and adaptability. We show for the first time that entrepreneurial managers of service firms who, in their efforts to outperform competitors pursue solution-based innovation addressing their clients’ needs, build and nurture a set of dynamic capabilities in episodic learning, client-focused learning and knowledge integration.

Our work breaks new ground by empirically showing that structured mechanisms for knowledge integration operate as a dynamic capability [defined as ‘collection of routines that enable an organization to perform some activity on a consistent (repeatable) basis’ (Winter, 2003)], thus extending the work of De Luca and Atuahene-Gima (2007). We demonstrate that KIC is driven by the two learning capabilities suggesting that the presence of new knowledge acquired through client-focused and episodic learning capabilities coupled with service entrepreneurship are prerequisites for knowledge integration to occur. While the episodic learning capability, represents experimental knowledge generated within the organization, client-focused learning capability represents the firm’s strategic effort to have a deeper understanding of clients’ needs. The link between knowledge heterogeneity and recombination in innovation has been suggested in past research (Adams & Graham, 2016; Sammarra & Biggiero, 2008). Findings support our theorization that the acquired new knowledge resources need to be integrated to existing knowledge. Further, our findings also suggest that as in other innovation contexts, service firms must have an appropriate balance in acquiring knowledge from external and internal sources for optimal innovation performance (Martini, Neirotti, & Appio, 2017).

Although the importance of knowledge from external and internal sources for innovation has been recognized in the services literature, they have not been viewed as capabilities to capture their potential to contribute to service firm competitive advantage. Our study is the first to show this, conceptualizing and operationalizing these activities as

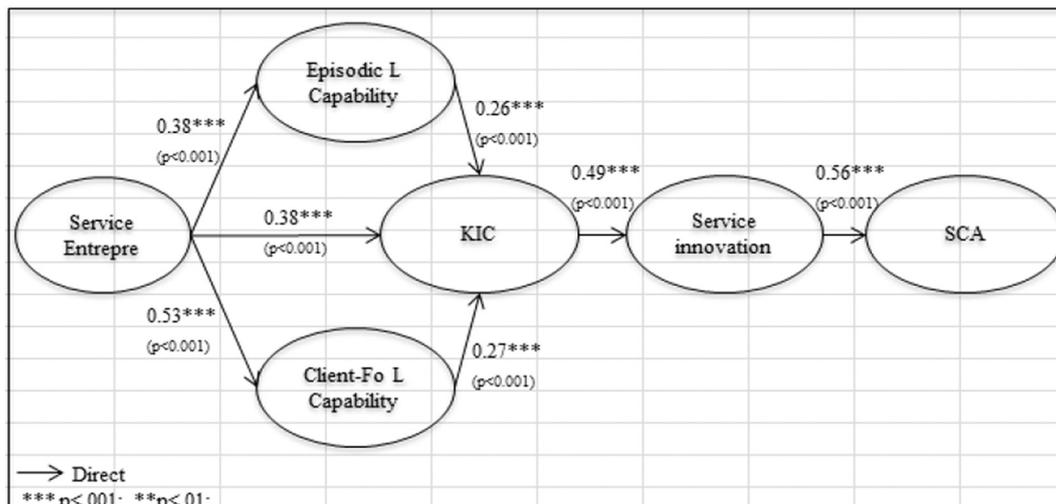


Fig. 2. Structural model: Australia.

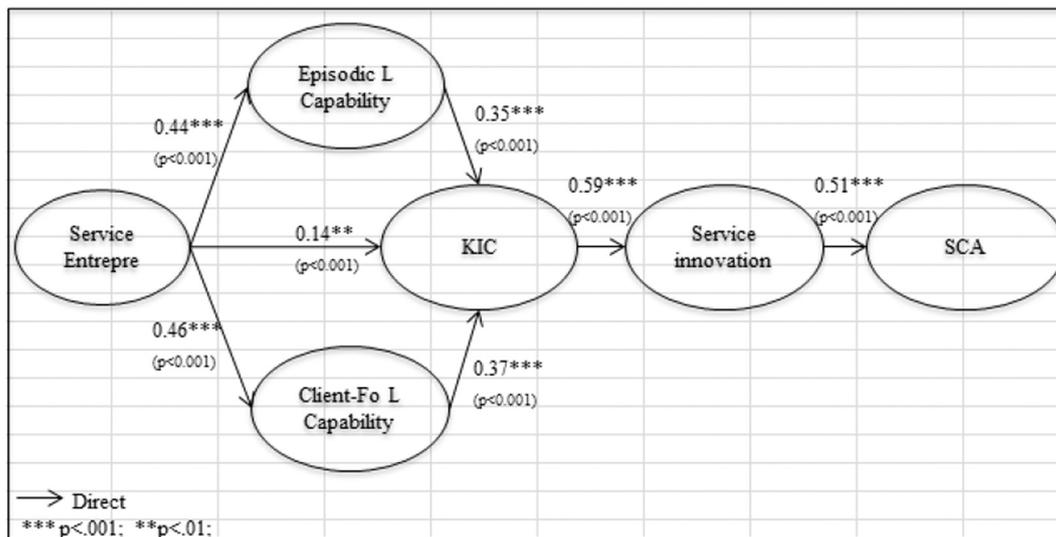


Fig. 3. Structural model: US.

dynamic capabilities thereby capturing their potential to contribute to service innovation-led competitive advantage. As such, we extend Janssen, Castaldi, and Alexiev (2015)'s work, by identifying specific knowledge sources that enable these capabilities to be exercised. Our findings provide support for the theoretical proposition that the role of dynamic capabilities is to provide the firm with new knowledge configurations enabling it to pursue greater innovation and enhanced value creation (Eisenhardt & Martin, 2000; Zahra et al., 2006).

Results of the mediation tests support our central argument that the extent of knowledge acquired per se will not lead to the design and delivery of client-focused solutions, but rather requires development of new knowledge configurations that captures knowledge developed through clients and internal sources. As noted earlier, several service researchers subscribe to this view (Leiponen, 2006; Okhuysen & Eisenhardt, 2002) but it has escaped empirical scrutiny in a service innovation context. Furthermore, we find support for Madhavaram and Hunt (2008) suggestion that achieving interdependence between knowledge creation and integration resources enhances the value of those resources leading to greater performance.

While the hypothesized relationship between KIC and service innovation was largely supported across the two samples, some interesting complexities were highlighted. First, greater efforts by project-oriented business service firms to integrate and deploy knowledge stocks should lead to increased innovation output. In order to effectively use knowledge from external sources, firms need effective internal integration mechanisms that allow for a process of re-combination – this enables a greater flow of innovation-related knowledge and innovation output (Martini et al., 2017). However, the negative quadratic effects of KIC on innovation in the Australian sample provide new insights over prior research, suggesting decreasing returns associated with increasing knowledge integration beyond a certain threshold. This signals inertia or dysfunctional rigidity effects (Leonard-Barton, 1992) and highlights the need for rejuvenation of the capability base through investments in new ways of doing things geared towards future and uncertain market opportunities. Fourth, as hypothesized, solution-focused service innovations reside in relational exchanges between the service firm and customer, leading to long-term relationships providing enduring competitive advantage to the focal firm. As such, our findings support Safizadeh, Field, and Ritzman's (2003) work that shows that service innovation flowing through and comprising interactive (front-end) and supportive (back end) elements is vital to competitive advantage. Finally, our findings support the inimitability of knowledge

resources as a source of SCA (Gustafsson & Johnson, 2003; Hall, 1993; Salunke et al., 2011).

6.1. Theoretical implications

Our results have important implications for service innovation-based competitive strategy literature. First, in somewhat of a departure from conventional market orientation literature (e.g. Day, 1994; Kohli & Jaworski, 1990), which includes both customer and competitor information, we found that client-focused learning is a better way to understand customer needs. Second, knowledge acquisition capabilities are pre-requisites for the firm's effort to generate new knowledge configurations to develop innovative client/customer solutions. Third, KIC emerges as the mediator between knowledge acquisition capabilities and service innovation-based competitive advantage. Fourth, our findings support the proponents of the view that the inimitability of knowledge-based capabilities is a source of SCA. Importantly, while other service firms can imitate new service concepts, the causal mechanisms and the capability configurations underpinning the solution-focused innovation perhaps are not readily apparent to competitors.

6.2. Managerial implications

Findings provide guidelines to assist managers in their quest to outperform their competitors through service innovation. Our findings suggest that managers must invest their time and resources to build and nurture organizational routines that form the building blocks of both episodic and client-focused learning capabilities and KIC. In a solution-focused innovation context, while past episodic knowledge can enable the firm to achieve 'economies' of knowledge generation, having a greater understanding of the needs of key clients will strengthen the knowledge base of the firm. Most importantly, managers must integrate the acquired knowledge with existing knowledge to develop new knowledge configurations in order to address client/customer needs. While episodic integration is central for the solution-based innovations, project-oriented firms have tended to disband and reallocate to other projects upon completing a project. Further, managers should adopt a service entrepreneurial posture in their efforts to outperform competitors through solution-based service innovation. While innovativeness, proactiveness and risk-taking are important behavioral attributes of this orientation, adaptiveness will enrich the entrepreneurship posture by requiring the firm to be receptive to clients' problems and requirements.

Service firms must constantly reinvest to maintain, hone, expand and reconfigure their assortment of capabilities to remain focused on clients' needs and stay ahead of competitors. The dynamic capability building activity must place emphasis on continuous development of new knowledge configurations as the market is a moving target.

6.3. Limitations and future research

As with all research, we acknowledge some limitations. First, the cross-sectional survey design (e.g. Melton & Hartline, 2010) limits the inferences drawn about causality between the variables of interest. In the absence of data collected over different time points, the manner in which firms create new value and outperform competitors over time could not be captured. Future research could investigate the temporal effects associated with this phenomenon. Our research takes initial steps to broaden the discourse of service innovation by presenting theoretically rich project settings beyond the traditional financial services context that past research has relied on. Second, while we deliberately surveyed senior managers as key informants, the use of single respondents is limited by the respondent not being necessarily being privy to all information of interest. However, senior managers arguably have the best vantage point and are likely to be knowledgeable and involved in strategic aspects of running the business (Hambrick, 1981). Future studies could consider the use of multiple respondents as key informants within a single firm. Finally, future research should consider

extending our research by including a non-project control group and also examining the differences between the project and non-project oriented context in relation to knowledge integration towards service innovation.

7. Conclusion

As a first study to empirically test the interplay of capabilities for knowledge integration in a project-oriented B2B service firm context, our work extends the service innovation literature. Findings demonstrate that the presence of *both* externally-focused and internally-focused knowledge is necessary but not sufficient for the development of customer-focused solutions. Knowledge should be complemented with KIC. Our choice of the project-oriented service firm context not only facilitated examining the complexities involved with knowledge management processes in the service innovation process but also provided evidence to support the view that service-innovation-based competitive advantages can be sustained. We offer guidelines to managers to assist in outperforming competitors. Specifically, we demonstrate the need to build and nurture a set of dynamic capabilities in knowledge to deliver solutions to customer problems, thereby creating an inimitability barrier to its closest competitors. Policy planners will benefit from our findings, which emphasize the role of service innovation in SCA. We encourage further research into this important and fruitful area.

Appendix A. Appendix 1: Battery of items

Service entrepreneurship (SE) items (semantic differential scale 1–5).

(i) ... is seldom the first to introduce new services in the marketplace/... is usually the first to introduce new services in the marketplace (proactive); (ii) ... an emphasis on the marketing of tried and true products or services/... an emphasis on the marketing of new and innovative products or services (innovative); (iii) ... offers a limited range of options that cater to client requirements/ ... uses a wide variety of strategies in order to offer appropriate solutions to clients (adaptive); (iv) ... take on projects in areas that are more easy to deal with/ ... take on projects in areas that have not been explored in the past (risk-taking)

Episodic learning capability items (Likert scale 1–5).

(i) Our firm learns from successes and failures in projects (create); (ii) Information is collected if unforeseen events (whether good or bad) occur in projects (create); (iii) Learnings from project challenges are used to inform of better processes for future projects (extend); (iv) Information gained from challenges in projects is used to improve skills within our firm (extend); (v) Our firm modifies practice using knowledge gained from unexpected project outcomes (modify); (vi) Our firm recombines unique information gained from projects with current knowledge to produce modified techniques (modify)

Client focused learning capability items (Likert scale 1–5).

(i) In our firm, interactions with clients provide new ideas to create future products or services (create); (ii) Our firm collects relevant information about the client's requirements in order to provide what's best for them (create); (iii) Unique client requirements (e.g. special needs) are used to improve the existing knowledge base (extend); (iv) Experienced clients provide useful insights that enable our firm to improve service delivery (extend); (v) Our firm reforms current practices using information gained from the diverse needs of different clients (modify); (vi) Our firm leverages information gained from different clients to make significant improvements to techniques (modify)

Knowledge integration capability (KIC) items (Likert scale 1–5).

(i) Our firm uses existing know-how in different ways to create new products or services (create); (ii) Team meetings involving specialists with different skills are used to generate new ideas (create); (iii) Our firm identifies further use(s) for existing resources by blending technological knowledge with market knowledge (extend); (iv) Our firm uses information gained from different experts to inform participants in project team meetings (extend); (v) Experience gained from careful allocation of scarce resources (e.g., manpower) is used to modify resource allocation procedures (modify); (vi) Our firm derives new services from existing resources by re-evaluating the ways in which they are used (modify)

Service innovation items (Likert scale 1–5).

Innovation refers to any NEW INITIATIVE that your company adopts in the provision of services. These activities directly or indirectly ADD VALUE TO THE COMPANY AND ITS CLIENTS. Have you introduced changes in the following areas or activities in the last FIVE YEARS?

(i) The areas of expertise that your firm offers; (ii) The speed in which your firm delivers services (e.g. accelerated delivery); (iii) The flexibility of your products or services (e.g., customization); (iv) The ways in which the services you provide are produced; (v) The ways in which the services you provide are delivered; (vi) The processes by which your firm procures resources to offer services (e.g. introducing new recruitment standards); (vii) The ways by which your firm evaluates the quality of the service offered; (viii) The nature of technology that is used to produce or deliver services.

Sustained competitive advantage (SCA) items (Likert scale 1–5).

(i) The innovations we introduced enabled us to enjoy a superior market position for a reasonable period; (ii) The new changes we introduced have been appreciated by our clients/customers giving us a distinct advantage for some time now; (iii) Our competitors could not easily match the advantages of the new products or services that we introduced; (iv) The new products or services we introduced were a stepping stone for further development.

Appendix B. Appendix 2: Mediation testing

H₈: EL → KIC → SI.

Model 1	Model 2: Mediated		
X → Y	X → M	M → Y	X → Y
$\beta = 0.26^{***}$ (0.50)^{***}	$\beta = 0.55^{***}$ (0.67)^{***}	$\beta = 0.43^{***}$ (0.46)^{***}	$\beta = 0.03^{ns}$ (0.19)^{***}
Sobel test statistic	5.66 (6.09)		

X – Causal variable; Y – Outcome variable; M – Mediator.

Please note: Values for the US sample in parenthesis below and highlighted in bold. The Australian sample indicates complete mediation and the US sample indicates partial mediation.

*** p < 0.01.

H₉: CL → KIC → SI.

Model 1	Model 2: Mediated		
X → Y	X → M	M → Y	X → Y
$\beta = 0.36^{***}$ (0.50)^{***}	$\beta = 0.57^{***}$ (0.65)^{***}	$\beta = 0.34^{***}$ (0.43)^{***}	$\beta = 0.17^{**}$ (0.23)^{***}
Sobel test statistic	4.89 (5.79)		

X – Causal variable; Y – Outcome variable; M – Mediator.

Please note: Values for the US sample in parenthesis below and highlighted in bold. Both samples indicate partial mediation.

*** p < 0.01.

** p < 0.05.

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