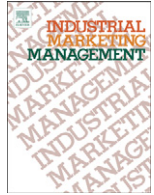




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## Industrial Marketing Management



## Reconceptualizing professional service firm innovation capability: Scale development

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## ABSTRACT

Building on capability theory, this paper presents a reconceptualization of the innovation capability construct within a knowledge-intensive service context, specifically, professional service firms (PSFs). Employing a rigorous multi-stage scale development process we interviewed 37 participants and surveyed 463 respondents across a wide range of PSFs including lawyers, accountants, consulting engineers and management consultants. The results of exploratory and confirmatory factor analyses highlight the multi-dimensional nature of innovation capability within this context. Three dimensions were identified: client-focused, marketing-focused, and technology-focused innovation capability. We provide evidence of face validity, content validity, convergent and discriminant validity, nomological validity and reliability of our scale. Our scale offers a new way to measure innovation capability within PSFs and highlights the need to move beyond the narrow manufacturing mind-set focus of prior innovation research. Implications for theory and practice are discussed.

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## 1. Introduction

Innovation is widely recognized as a key driver of economic growth and plays a crucial role in competition at both a national and firm level (Organisation for Economic and Co-operative Development (OECD), 2010). An ability to innovate provides a strong basis for organizations to obtain and sustain superior performance and competitive advantage (Barney, 1991; Day, 1994). Despite the importance of innovation to all organizations, prior research has mainly focused on high-technology and manufacturing industries (Ettlie & Rosenthal, 2011; Miles, 2005). Although a number of recent studies have begun to address this issue (e.g., Agarwal & Selen, 2009; Arnold, Fang, & Palmatier, 2010; Nasution & Mavondo, 2008; Song, Song, & Di Benedetto, 2009), our understanding of innovation in low-technology and service industries is less well understood (Den Hertog, Van der Aa, & De Jong, 2010; Ettlie & Rosenthal, 2011). Indeed, measuring ways in which service firms innovate has recently been listed among the top-ten-research priorities for the science of services (Ostrom et al., 2010).

A significant gap exists in our knowledge of the measurement of service firm innovation capability (Adams, Bessant, & Phelps, 2006), and “there is evidence that the notion of innovation, well established

in the manufacturing sector, cannot simply be transposed to the service sector” (Hipp & Grupp, 2005, p. 517). For example, within the service sector, a strong emphasis on the ability to develop non-technological innovation exists in the form of management processes, marketing, design, customized solutions, the use of human capital, and forms of industry collaboration (Djellal & Gallouj, 2001; Drejer, 2004). These issues highlight the importance of the development of a specific measure of professional service firm (PSF) innovation capability.

Such firms are unique as they are high in credence qualities as their core output is applied knowledge and skills that are difficult for a customer (client) to acquire. Accordingly, clients find it difficult to evaluate the quality of such service, even after use (Darby & Karni, 1973; Ostrom & Iacobucci, 1995). Chan, Yim, and Lam (2010, p. 49) also suggest that professional services offer greater value creation opportunities for service providers and customers due to “high credence qualities, high degrees of customer contact and customization, and high interdependence between customers and service providers”. Consequently, PSFs provide an interesting context for understanding a firm’s ability to integrate and deploy resources to create value.

The present study is grounded in the capability-based view of competitive strategy. An extension of the resource-based view of competitive strategy, capability theory suggests that an organization’s source of competitive advantage lies in its ability to leverage or deploy organizational assets effectively. Rather than accruing a stock of resources, such as physical, human, or knowledge assets (Amit & Schoemaker, 1993; Day, 1994; Dierickx & Cool, 1989), capability theory asserts superior performance comes from an ability to deploy such assets. An organization’s innovation capability is one of the most

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vital capabilities in delivering superior value for a firm and its customers (Agarwal & Selen, 2009; Calantone, Cavusgil, & Zhao, 2002; Lawson & Samson, 2001; Nasution & Mavondo, 2008; Ngo & O'Cass, 2009; Weerawardena & O'Cass, 2004). However, previous innovation capability measures have been based on narrow conceptualizations developed in manufacturing and high-technology industries (e.g., product or process, radical or incremental), or have not been based on rigorous scale development procedures.

Our reconceptualization of the innovation construct as a capability, and the subsequent rigorously developed and validated measure, extends resource and capability-based theory by providing a means to assess, and therefore manage, such critical skills and abilities. The absence of valid measures to capture an organization's innovation capability limits the progression of capability-based theory, highlighting the need to more fully capture PSFs' innovation capability (Den Hertog et al., 2010; Ostrom et al., 2010).

The current study contributes to the development of capability theory in two important ways. First, as the only empirical study of PSFs' innovation capability, we identify a range of dimensions of innovation capability in this context. Second, an innovation capability scale is developed and validated across two separate samples. Evidence as to the measure's factor structure, dimensionality, scale reliability and validity is presented; preparing the groundwork for research to identify the drivers and performance outcomes of innovation capability in a professional service context.

An overview of the theoretical foundations of resource and capability-based theory is provided in the next section, after which previous research into innovation capability is discussed. The processes associated with the present qualitative and quantitative studies, including establishing the scale's psychometric properties are then presented. The final section of the paper provides an overview of the main conclusions and their managerial implications and offers some directions for future research.

## 2. Conceptual development

### 2.1. Resource and capability-based theory

Resource theory provides insight into the potential benefits of acquiring and leveraging internal organizational resources so as to achieve superior organizational performance and competitive advantage (Barney, 1991; Bharadwaj, Varadarajan, & Fahy, 1993; Day, 1994). Resource-based theory suggests that an organization's firm-specific resources are a source of sustainable economic rent when they are valuable, rare and difficult to imitate or substitute (Barney, 1991; Peteraf, 1993). According to resource-based theorists, an organization's assets are distinct from its capabilities because assets are not activity chains or processes (Amit & Schoemaker, 1993; Hooley, Broderick, & Moller, 1998). Rather, assets are owned or controlled by a firm and can be tangible (e.g., buildings, land, financial) or intangible (e.g., reputation, brand, knowledge) (Amit & Schoemaker, 1993; Hooley et al., 1998). Tangible assets can be acquired through external transactions, whereas intangible assets tend to accumulate within a firm over time and, therefore, are a more durable source of competitive advantage (Peteraf, 1993).

As an intangible asset, the special characteristics of knowledge, such as tacitness and complexity, provide a basis for competitive advantage (Grant, 1996; Spender, 1996). Within PSFs, the primary asset providing a foundation for competitive advantage is knowledge, which is largely tacit in nature and resides in the professionals themselves. Indeed, the central element of professional services is that they transfer expert knowledge that is encoded in services and products and enhance the value of all other sectors' outputs through the provision of innovative solutions that are highly knowledge-based and intangible (Miles, 2005; Nachum, 1999).

Although knowledge provides a basis for competitive advantage, it is only one of the many input factors to innovation and value creation (Løwendahl, 1997). While important, assets by themselves do not produce a firm's competitive advantage. Rather, assets can only be a source of advantage if they are used to do something, such as exploit knowledge or innovate (Grant, 1996). Whereas assets are owned or controlled by a firm, capabilities are used to combine, develop and transform assets to create value offerings for customers (Day, 1994; Grant, 1996). Capabilities have been defined as an "organization's capacity to perform a range of organizational routines...for the purposes of delivering products and services to the market in a manner that outperforms competitors" (Weerawardena, 2003, p. 17). As such, capabilities are more than assets. Capabilities are embedded in the firm and are path-dependent routines and information-based processes that are realized through learning-by-doing (Barney, 1991; Day, 1994; Eisenhardt & Martin, 2000).

Thus, capabilities are the most difficult resources for competitors to duplicate due to their high levels of causal ambiguity (Galbreath, 2005), and research has highlighted the importance of distinct capabilities to performance outcomes (e.g., Allred, Fawcett, Wallin, & Magnan, 2011; Ethiraj, Kale, Krishnan, & Singh, 2005; Song, Di Benedetto, & Nason, 2007). Indeed, Ethiraj et al. (2005) advocated a shift in the debate from whether or not capabilities matter, to what capabilities matter and how. Moreover, in a service context, they found that firm capabilities are often context-specific, and called for future research into the capabilities specific to a context and the careful empirical estimation of their significance and value. Again in the context of services, Bharadwaj et al. (1993) presented a contingency model of the distinctive skills and resources underlying sustainable competitive advantage in such industries. They suggested that service firms gain competitive advantage by being innovative and breaking traditional molds (e.g., in traditional commercial banking, some banks offer specific segments financial and investment advice at an individual customer level).

Within knowledge-intensive service contexts, the ability to transform existing knowledge into new knowledge (i.e., the ability to innovate or utilize a firm's innovation capability) is recognized as an important source of competitive advantage (Watson & Hewett, 2006). In a professional service context, the ability to provide innovative services and solutions more effectively and efficiently than competitors is increasingly seen as a way to retain existing clients, expand offerings and obtain new clients (Barr & McNeilly, 2003). Consistent with capability-based theory, innovation capability is critical to the development and commercialization of new services and solutions that create value for the firm and its clients (Day, 1994; Lawson & Samson, 2001; Nasution & Mavondo, 2008; Weerawardena & O'Cass, 2004).

### 2.2. Innovation capability

Terms such as innovation, innovation capacity, innovative capability and innovation capability appear in the innovation literature and have been used interchangeably. Some suggest that this has hampered the development of innovation theory (Dewett, Whittier, & Williams, 2007; Downs & Mohr, 1976), while others suggest that the effect of this variance is minimal (Damanpour, 1991). Lawson and Samson (2001) argued that innovation and innovation capability occur at different stages of the innovation process, in which innovation capability is a critical element in developing innovation outputs. Lawson and Samson (2001, p. 384) suggested that an organization's innovation capability arises from the skills and abilities that enable the application of resources, and reflects an "ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders".

Romijn and Albaladejo (2002, p. 1054) referred to innovation capability as "the skills and knowledge needed to effectively absorb, master, and improve existing technologies, and to create new ones"; while Xu, Lin, and Lin (2008, p. 792), defined innovative capability

as “the capacity of gaining access to, developing and implementing innovative technologies for designing and manufacturing”. Koc (2007, p. 375) considered innovative capacity to be “the continuous improvement of the overall capabilities and resources that the firm possesses to explore and exploit opportunities for developing new products to meet market needs”; whereas Chen (2009, p. 94) defined innovative capabilities as a “firm’s capabilities, grounded in the processes, systems, and organizational structure, which can be applicable to the product or process innovation activities”.

While these latter definitions provide some understanding of the nature of innovation capability, they emphasize capabilities in developing new technology, products or processes. Ngo and O’Cass (2009, p. 48) provided a more comprehensive understanding of this construct and defined innovation-based capability as “the integrative process of applying the collective knowledge, skills, and resources of the firm to perform innovation activities pertaining to technical innovations (products and/or services, and production process technology), and non-technical innovations (managerial, market, and marketing)”. Capability theory presumes there is a ‘capability differential’ that allows an organization to achieve a sustainable competitive advantage through a range of distinctive capabilities (Weerawardena & McColl-Kennedy, 2002), and we support this broader conceptualization of innovation capability.

Accordingly, capability theory provides a useful framework for understanding PSFs’ innovation activities, enabling us to define innovation capability as a firm’s ability, relative to its competitors, to apply the collective knowledge, skills, and resources to innovation activities relating to new products, processes, services, or management, marketing or work organization systems, in order to create added value for the firm or its stakeholders. This definition takes a holistic view of the innovation capability construct as it not only considers a broad range of innovation activities, but also considers their performance implications.

### 2.3. Innovation capability measures

Lawson and Samson (2001) emphasized the need for further research to identify and refine different types of innovation capability measures. A review of the innovation capability construct revealed inconsistent dimensionality and operationalization. For example, Ngo and O’Cass (2009) suggest three dimensions (possession, application and full utilization), while Wang and Ahmed (2004) suggest five dimensions (product, process, market, behavioral and strategic innovation). Panayides (2006) based their conceptualization on individual innovativeness, rather than on organizational innovation. In a service context, Grawe, Chen, and Daugherty (2009) developed a unidimensional customer service innovation capability scale; although they did not explore the full range of possible innovation capability forms. Nasution and Mavondo (2008) used a more traditional product and operational process differentiation approach, adding an administrative innovation capability dimension that reflects the flexibility and accuracy of procedures. However, richer innovation capability measures, such as the one proposed by Wang and Ahmed (2004), offer a more appropriate conceptualization, particularly in the complex professional service domain.

The preceding discussion suggests that there are distinct organizational innovation aspects, while capability theory, which links resource-based theory and innovation theory, supports the multidimensional nature of the innovation capability construct. We therefore took up Lawson and Samson’s (2001) call for further research to identify and refine innovation capability measures to provide a better understanding of this construct in light of this view. As was noted earlier, in the present case the issue was examined in a professional service context, as is outlined in the next section.

## 3. Method

This section describes the process that was used to establish the content for the innovation capability dimensions and to validate

the scale psychometrically and theoretically. The process follows Churchill’s (1979) and De Vellis’s (1991) conventional approach for developing multiple-item constructs and is consistent with the approach taken by other researchers who have developed capability scales (e.g., Ngo & O’Cass, 2009).

### 3.1. Item generation and content validity

#### 3.1.1. Study 1

Based on our definition of innovation capability and a review of the innovation and capability-based literature, the first stage of the scale development process involved item generation and an assessment of content validity. Depth interviews with professional service providers were used to generate the item pool. A purposive sample was used as this stage was developmental (Saunders, Lewis, & Thornhill, 2000). Thirty seven senior executives who worked in a range of Australian PSFs, including consulting engineers, accountants, lawyers, financial planners and marketing and management consultants, and who were knowledgeable about the innovation capability of their firm were interviewed. The interviews were conducted in regional and metropolitan locations in three Australian states with firms that ranged in size from less than ten employees to more than one thousand employees, although two-thirds of the firms had less than fifty employees.

Depth interviews are an excellent way to obtain insights into a phenomenon of interest, as they provide detailed contextual information that cannot be obtained from survey approaches (Gwinner, Gremler, & Bitner, 1998; Malhotra, Hall, Shaw, & Oppenheim, 2002). A discussion guide was used for the interviews along the lines suggested by Minichiello, Aroni, Timewell, and Alexander (1995). Following a brief description of the research project, interviews began with the collection of background information about the organization, the organization’s client base and its culture. Participants were then asked about the degree to which their firm was innovative and the nature of these innovation activities. Probing statements were used to clarify and explore participants’ responses, especially to help identify the types of innovation activities used (e.g., “tell me more about that”, “what sort of things do you do” and “what do you mean by that”). Participants were also encouraged to discuss other types of strategic activities the firm undertook. At the end of the interview, participants were asked for additional comments and for descriptive information, such as firm size, years of operation and performance. Each interview lasted from approximately 45 min to an hour and was audio-taped for later transcription.

Qualitative content analysis was used to analyze the interview data, as this technique considers the importance of themes, rather than the quantification of words and categories (Flick, 1998). All interviews were transcribed verbatim, yielding approximately four hundred pages of transcripts that were read for accuracy and imported into a qualitative data analysis tool. Coding was done using QSR’s NVivo software package, which is a widely accepted analysis tool for qualitative research that allows a detailed analysis of interview transcripts (Malhotra et al., 2002). Text associated with each code were printed, reread and refined to identify key themes. The findings are the product of repeated readings of the interview transcripts and the coding and refining of emerging themes.

Participants described a wide range of innovation capability dimensions that were not restricted to a specific professional service type, location, or firm size. Innovation capability was not only viewed as important to larger firms, but also viewed by smaller firms as a way to add value for clients and to differentiate their firm and the firm’s products and services from competitors. The open-ended nature of the questions allowed respondents to describe what innovation meant to them. No particular type or dimension of innovation capability (i.e. technology, product or process innovation capability) was imposed, which resulted in respondents describing a wide range of



innovation capability dimensions and their potential effects in professional service contexts (see Table 1). Wang and Ahmed's (2004), five innovation capability dimensions [(1) service and product, (2) marketing, (3) strategy, (4) behavioral, and (5) process] were reflected in participants' responses. However, two additional themes emerged that had not previously been seen as distinct innovation capability dimensions. The first concerned the ability to offer innovative solutions to clients and the second the ability to innovate using technology (Table 1).

As part of the item generation process, existing innovation capability measures were examined in this stage. Scales developed by Calantone et al. (2002), Tuominen and Anttila (2006), and Wang and Ahmed (2004) were also reviewed. Based on the interviews and a number of items from these scales, an initial pool of 77 items was generated. As the aim was to maximize the content validity of the scale, a degree of redundancy was accepted in this stage of the scale's development (Churchill, 1979; De Vellis, 1991).

In order to select the most appropriate items and verify their suitability, the second stage involved item-refinement through an expert panel of seven professors and doctoral students. The experts were asked to review and evaluate the relevance of each item with respect to the definition presented for each of the dimensions on a seven-point Likert-type scale that ranged from "not at all representative" to "strongly representative". These definitions followed Wang and Ahmed's (2004) description of their five innovative capabilities. In addition, panel members were asked if they felt any of the items reflected more than one dimension, and if the items were clear, concise or redundant. Items with low assessment scores were eliminated, leaving a total of 49 items.

Consistent with the depth interviews, the experts identified dimensions reflecting the ability to offer innovative solutions to clients, and the ability to innovate using technology, as separate innovation capability dimensions. The initial scale therefore reflected the proposed five dimensions and the additional two derived dimensions. A questionnaire measuring these dimensions and a number of organizational performance items was developed and pre-tested on 20 MBA students who were currently working, or had previously worked, in a PSF. The 49

retained items were randomized and, consistent with the strategic management literature and resource and capability-based theory, respondents were asked to rate their firm relative to competitors using the stem, "relative to competitors our firm's ability to..." on a seven-point multiple-item scale that ranged from much worse than competitors (1), to much better than competitors (7). This led to minor changes to the instructions and to some items being reworded to improve their clarity. The next stage of the scale development process involved item purification based on measurement properties, as is outlined in the next section.

### 3.2. Item purification

#### 3.2.1. Study 2

As the population of interest was professional service providers, and since the purpose was to measure organizations' innovation capability and not individual behaviors or attitudes, senior executives in PSFs based in metropolitan and regional areas were surveyed. These respondents were members of a large international commercial research firm's online panel. A web-based survey, rather than a paper and pencil mail survey, was felt to be the most appropriate data collection method, as mail surveys of busy professionals suffer from low and declining response rates (Deutskens, de Jong, de Ruyter, & Wetzels, 2006). Panel members received an e-mail invitation to participate that included a brief introduction and a link to the Web questionnaire. Each panel member had a unique ID code to ensure that the same respondent did not complete more than one questionnaire. A number of screening questions were used to ensure only qualified respondents participated in the survey.

A total of 463 responses were obtained that were divided into two sub-samples. The first was used to purify, confirm and validate the various constructs' measures included in the research, while the second was used for cross-validation (Churchill, 1979). To maintain an adequate sample size for each sub-sample, a 55%–45% stratified random split was used, resulting in a sample of sufficient size (analysis sample = 255 and validation sample = 208) to achieve a high level

**Table 1**  
Dimensions of professional service firm innovation capability.

Innovation capability dimension	Examples drawn from interviews
New separate dimension: client-solution	I think we are innovative in some of the legal advice we give, we've done a lot of firsts and we are able to solve a lot of problems in very innovative ways for clients doing big deals, big transactions, whether we've saved them a million bucks or \$1 billion, so I think there is definitely that innovation at a legal level [Law, Metropolitan].
New separate dimension: technology	On utilizing the latest technology in the industry to carry out our tasks...our clients aren't aware of the technology, management look into the benefits. Competitors are not as innovative with technology, we do things smarter [Consulting Engineering, Regional].
Service/product	I think we have to be fairly innovative in what we offer, so we are innovative in the sense of the services and products we offer to our clients [Market Research, Metropolitan].
Marketing	I would say well innovative...particularly from a marketing perspective...we are seen as leaders, our reputation, of doing things a little bit differently. When the firms merged...they came up with the whole rebrand which was our logo and all of those sorts of things, and I think that was the first major rebrand of a law firm in Australia for a very long time...and that was seen as being really breaking away from the conservative legal mold, and in some circles seen as just not what you should do...So, I guess in that regard competitors probably see us as, as being a little bit different...and doing things before they do, but also in a few kinds of things that aren't traditional for law firms to do, so kind of being a bit at the cutting edge of some areas [Law, Metropolitan].
Strategy	There are a number of people whose jobs are not client-focused, they are firm-focused and it is their job to come up with research business development strategies, all those sorts of things, so it's constantly going. For example, we have just delivered a new strategy called "xxx" which is a website in Australia...it's what we call the national enterprise space, that is companies that are between \$5 million and \$500 million turnover, not that they are really large companies, but the companies in between, so that is just something that is being developed...we're always looking for new ideas [Accounting, Regional].
Behavioral	We're always trying to think of new ways of how we can do something better [Law, Metropolitan].
Operational process	We've actually dedicated a senior manager to having a look at ultimate ways to handle our internal resourcing, so in the way that we manage our teams internally. We've locked someone in a room, essentially and given them the org charts and all the information we can about what we're doing and who is available to do what, and we're just trying to chart different ways to actually, so we're talking about trying to change and focus more along the major projects that we have going, which is a different way to do it, compared to historical methods. We don't know if it'll work, but at least we're going to have a go at it, that's the best innovation I can think of [Consulting Engineering, Metropolitan].

of statistical power (Hair, Black, Babin, Anderson, & Tatham, 2006; McQuitty, 2004).

For the sample as a whole, the firm's average age was 28 (ranging from 1 year to 211 years), and the average percentage of corporate, government and other clients (individuals) was 60%, 16% and 24% respectively, although these percentages ranged from 0% to 100% in each category. The average number of total employees, was 538, although the smallest number of employees was one (an owner/manager or sole practitioner), while the largest firm had 9999 total employees. The average number of partners and other professional employees (e.g., associates) was 38 and 48 respectively, ranging from 0 (in the case of owner–manager/sole practitioner) to 800 for partners, and from 0 (in the case of owner–manager/sole practitioner) to 811 for other professional employees. The PSF categories ranged from 8% for marketing and market research firms to 37% for accounting firms, while 83% of the firms operated in metropolitan locations. Firms with offices located in Australia's various States and Territories ranged from 12% for the Northern Territory to 44% for Victoria, while 13% had overseas offices.

## 4. Data analysis

### 4.1. Item reduction and exploratory factor analysis

In order to validate the innovation capability scale and its structure, a series of exploratory and confirmatory factor analyses were undertaken (Bearden, Hardesty, & Rose, 2001). Prior to this, the data were screened to identify outliers and to test for violations of the assumptions of multivariate analysis. The Statistical Package for the Social Sciences (SPSS version 15) was used to undertake this preliminary analysis and the initial exploratory factor analysis (EFA), while LISREL 8.51 was used to estimate the various confirmatory factor analysis (CFA) procedures.

A series of exploratory factor analyses were initially undertaken on the analysis sample using principal component analysis and oblimin rotation as there was no a priori reason to assume the dimensions were not related. The Kaiser–Meyer–Olkin Measure of Sampling Adequacy was 0.97, suggesting that factor analysis was appropriate. An iterative process was used to eliminate items with low loadings or high cross loadings (Hair et al., 2006), which led to the retention of 26 items shown in Table 2.

The final factor analysis found three factors with eigenvalues greater than one, that together explained 72% of the total variance. An examination of the factor loadings suggested that the first factor reflected a PSF's ability to provide clients with new services and products and an ability to solve clients' problems in innovative ways. This factor was labeled *client-focused innovation capability* and included items that were initially classified within the service/product, behavioral and process innovation capability dimensions. For example, the client-focused innovation capability dimension included items from product/service innovation, such as the ability to “provide our clients with services/products that offer benefits superior to those of competitors”, and from behavioral innovation, such as the ability to “seek out novel ways to tackle problems”, and “implement new ideas within the firm”. The client-focused innovation capability dimension provides a broader conceptualization to problem solutions, or ad hoc innovation, as has been discussed (e.g., Djellal & Gallouj, 1999), but which has not been measured previously in this way.

The second dimension reflects *marketing-focused innovation capability* (i.e., a firm's ability to develop and implement novel promotional approaches, and an ability to implement innovative marketing programs for its services and products in order to keep ahead of the market). The third dimension measured *technology-focused innovation capability* (i.e., a firm's ability to adopt new software, integrated systems and technology, and an ability to innovate with software and technology in order to keep ahead of the market). Cronbach alphas for the three dimensions were 0.96, 0.93, and 0.93, respectively,

**Table 2**  
Exploratory factor analysis for innovation capability.

Scale items	Factor loadings
<i>Client-focused innovation capability (CFIC)</i>	
Inn_13 Present our clients with unique solutions they may not have considered (S)	0.97
Inn_11 Present innovative solutions to our clients (S)	0.93
Inn_8 Solve clients' problems in very innovative ways (S)	0.89
Inn_9 Provide innovative ideas and solutions to clients (S)	0.86
Inn_10 Come up with new ideas to provide innovative solutions to our clients' problems (S)	0.85
Inn_34 Be open to unconventional ideas (B)	0.78
Inn_1 Provide our clients with services/products that offer unique benefits superior to those of competitors (S/P)	0.76
Inn_35 Seek out novel ways to tackle problems (B)	0.76
Inn_38 Improvise on new methods when we cannot solve a problem using conventional methods (P)	0.68
Inn_32 Implement new ideas within the firm (B)	0.64
Inn_12 Be industry leaders in providing innovative solutions (S)	0.62
Inn_42 Introduce new service delivery processes to add value for our clients (P)	0.59
Inn_43 Develop new processes to deliver our services/products (P)	0.58
Inn_5 Develop new products that enhance our service to clients (S/P)	0.51
Inn_6 Deliver cutting-edge services/products that are not delivered by competitors (S/P)	0.46
<i>Marketing-focused innovation capability (MFIC)</i>	
Inn_20 Come up with novel marketing events to promote our firm	0.90
Inn_15 Adopt novel ways to market our firm	0.88
Inn_16 Implement new marketing strategies not currently used by competitors	0.85
Inn_14 Develop “revolutionary for the industry” marketing programs for our services/products	0.83
Inn_17 Innovate with our marketing programs to keep ahead of the market	0.77
Inn_21 Implement innovative marketing programs	0.73
<i>Technology-focused innovation capability (TFIC)</i>	
Inn_45 Innovate with new software	0.89
Inn_49 Adopt the latest technology in the industry	0.88
Inn_46 Innovate with new technology	0.86
Inn_48 Introduce new integrated systems and technology	0.79
Inn_47 Innovate with our software/technology to keep ahead of the market	0.74

Note: Initial classification of items: S/P = service/product; S = solution; B = behavioral; P = operational process.

which were well above the recommended lower limit of 0.70 (Hair et al., 2006), suggesting that the scales have very good internal consistency. Since Cronbach's alpha is sensitive to the number of items within a scale, the item-to-total correlations were also examined. All were above the suggested lower limit of 0.30, providing strong support for each item's contribution to its dimension (Nunnally & Bernstein, 1994).

#### 4.2. Confirmatory factor analysis

To further assess the scale's factor structure, a confirmatory factor analysis was also undertaken on the analysis sample. Successive modifications were made in which one item was removed in each iteration until the parameters and the fit indices reached recommended values (Jöreskog & Sörbom, 1996). As a result, some items were eliminated, resulting in the 13-item three-dimensional scale that is shown in Table 3.

Table 3 shows the fit statistics for the innovation capability scale for both the analysis and the validation samples. The Tucker–Lewis index (TLI, 0.98), the comparative fit index (CFI, 0.98), the goodness-of-fit index (GFI, 0.94) and the standardized root mean residual (SRMR, 0.03) were in line with established criteria for the analysis sample. Although the chi-square statistic's *p*-value was significant, this measure is sensitive to sample size (Hair et al., 2006). Consequently, the normed chi-square statistic ( $\chi^2/df$ ) was examined. In this case, the normed chi-square ( $\chi^2/df$ , 1.85) was acceptable (Bollen, 1989).

#### 4.3. Reliability and validity assessment

Coefficient alpha estimates were 0.92 for the revised client-focused innovation capability dimension, 0.90 for the revised marketing-focused innovation capability dimension, and 0.91 for the revised technology-focused innovation capability dimension in the case of the analysis sample. All of the indicator *t*-values were significant ( $p < 0.05$ ), supporting the convergent validity of each dimension. Evidence of discriminant validity was provided from Fornell and Larcker's (1981) test in which pairwise correlations between the factors obtained from the three-factor correlated model were compared

with the average variance extracted (AVE) scores for the constructs making up each possible pair. Discriminant validity is supported if the AVE scores exceed the square of the correlation between the factors making up each pair (Fornell & Larcker, 1981). The squared correlations between the dimensions ranged from 0.45 for client-focused innovation capability and marketing-focused innovation capability, to 0.58 for client-focused innovation capability and technology-focused innovation capability, which were less than the lowest AVE score (0.69), supporting the dimensions' discriminant validity.

Anderson and Gerbing's (1988) chi-square difference test was also used to test the discriminant validity between the innovation capability dimensions. Discriminant validity was evaluated by constraining the estimated correlation parameter ( $\phi$ ,  $\phi_{ij}$ ) between two constructs to 1.0, and examining the chi-square difference between the constrained and unconstrained models. A significantly lower  $\chi^2$  value for the unconstrained model suggests that the constructs are not perfectly correlated, supporting their discriminant validity (Anderson & Gerbing, 1988). The  $\chi^2$  values for all possible pairs of constructs for both the analysis and validation samples were significantly lower for the unconstrained models. The chi-square difference tests offer further evidence of discriminant validity, as all constructs in the model were distinct.

The nomological validity of the innovation capability scale was also tested by examining the scale's ability to behave as theoretically expected with respect to other constructs (Hair et al., 2006). Well-grounded theoretical and empirical research has supported a positive association between innovation and organizational performance (e.g., Han, Kim, & Srivastava, 1998; Jimenez-Jimenez & Sanz-Valle, 2010). Consequently, if the innovation capability scale's dimensions were positively and significantly correlated with organizational performance measures, nomological validity would be demonstrated.

Since all aspects of an organization's performance are not assessable by a single performance measure (Snow & Hrebiniak, 1980), organizational performance measures included non-financial and financial performance (i.e., customer, market and financial). As most PSFs do not publicly report their performance, subjective performance measures were used. Previous research has found a strong correlation between subjective and objective performance measures

**Table 3**  
Measurement properties of the innovation capability scale.

Factor item	Analysis sample (N = 255)			Validation sample (N = 208)		
	Reliability	AVE	Factor loading	Reliability	AVE	Factor loading
Client-focused innovation capability (CFIC)	0.92	0.70		0.93	0.72	
Inn_1 Provide our clients with services/products that offer unique benefits superior to those of competitors			0.80			0.84
Inn_8 Solve clients problems in very innovative ways			0.84			0.86
Inn_9 Provide innovative ideas and solutions to clients			0.86			0.84
Inn_11 Present innovative solutions to our clients			0.89			0.87
Inn_35 Seek out novel ways to tackle problems			0.80			0.82
Marketing-focused innovation capability (MFIC)	0.90	0.69		0.92	0.75	
Inn_14 Develop "revolutionary for the industry" marketing programs for our services/products			0.83			0.89
Inn_15 Adopt novel ways to market our firm			0.81			0.83
Inn_17 Innovate with our marketing programs to keep ahead of the market			0.91			0.91
Inn_21 Implement innovative marketing programs			0.77			0.83
Technology-focused innovation capability (TFIC)	0.91	0.72		0.91	0.71	
Inn_45 Innovate with new software			0.87			0.82
Inn_46 Innovate with new technology			0.86			0.90
Inn_48 Introduce new integrated systems and technology			0.85			0.88
Inn_49 Adopt the latest technology in the industry			0.82			0.77
Goodness-of-fit indices	$\chi^2$	Normed $\chi^2$	TLI	CFI	GFI	SRMR
Analysis sample	114.96	1.85	0.98	0.98	0.94	0.03
Validation sample	101.33	1.63	0.98	0.98	0.93	0.03

Note: All factor loadings are significant ( $p < 0.05$ ). AVE = average variance extracted;  $df = 62$  for both samples;  $\chi^2$  = chi-square; Normed  $\chi^2 = \chi^2/df$ ; TLI = Tucker–Lewis index; CFI = comparative fit index; GFI = goodness of fit index; SRMR = standardized root mean residual; factor loadings are the completely standardized parameter estimates.

**Table 4**  
Nomological validity of the innovation capability scale.

	CFIC	MFIC	TFIC	CP	MP
<i>Analysis sample</i>					
Client-focused innovation (CFIC)					
Marketing-focused innovation (MFIC)	0.63**				
Technology-focused innovation (TFIC)	0.70**	0.67**			
Customer performance (CP)	0.60**	0.28**	0.43**		
Market performance (MP)	0.43**	0.48**	0.45**	0.41**	
Financial performance (FP)	0.37**	0.41**	0.45**	0.42**	0.73**
<i>Validation sample</i>					
Client-focused innovation (CFIC)					
Marketing-focused innovation (MFIC)	0.61**				
Technology-focused innovation (TFIC)	0.70**	0.73**			
Customer performance (CP)	0.54**	0.32**	0.44**		
Market performance (MP)	0.43**	0.47**	0.48**	0.44**	
Financial performance (FP)	0.42**	0.34**	0.41**	0.48**	0.64**

\*\*  $p < 0.01$ .

(e.g., Dess & Robinson, 1984; Venkatraman & Ramanujam, 1986), suggesting that such assessments were reasonable in the present research context.

As with the innovation capability items, respondents evaluated their firm's organizational performance relative to their main competitors on a seven-point scale that ranged from much worse than competitors (1), to much better than competitors (7). Client satisfaction, sales volume and overall profitability were used to assess respondents' perceptions of performance. As can be seen in Table 4, all of the correlations in the analysis sample were significant and in the anticipated direction, providing evidence of nomological validity for the proposed innovation capability scale.

4.4. Replication of the innovation capability scale

The results of the CFA estimated for the validation sample data provided further evidence that the suggested innovation capability model was a reasonable representation of the data (see Table 3). In this case, the Tucker–Lewis index (TLI, 0.98), the comparative fit index (CFI, 0.98), the goodness-of-fit index (GFI, 0.93) and the standardized root mean residual (SRMR, 0.03) again suggested a good fit. The chi-square statistic's  $p$ -value was again significant. However, the normed chi-square ( $\chi^2/df$ , 1.63) was acceptable.

The reliability estimates were 0.93 for client-focused innovation capability, 0.92 for marketing-focused innovation capability, and 0.91 for technology-focused innovation capability. All of the factor loadings were statistically significant well beyond the 0.05 level, ranging from 0.77 to 0.91. The AVE scores were all above 0.70, supporting the constructs' convergent validity. The squared correlations between the dimensions in this case ranged from 0.44 for client-

focused innovation capability and marketing-focused innovation capability, to 0.62 for marketing-focused innovation capability and technology-focused innovation capability; all of which were less than the lowest variance extracted score (0.71), supporting the three dimensions' discriminant validity in the validation sample. Again the three innovation capability dimensions were positively correlated with the performance measures in the validation sample, demonstrating nomological validity (Table 4).

4.5. Competing models

A series of competing factor models were evaluated to assess the quality of the final model. The alternative models estimated included (1) a null model, (2) a unidimensional model in which all items loaded on a single factor, (3) a three-factor model in which the factors were uncorrelated, and (4) the final three-factor model with correlations between the factors. As these were nested models, chi-square difference tests were used to assess which model provided a better fit to the data (Hair et al., 2006). Statistical significance was tested through a  $\Delta\chi^2$  value (Hair et al., 2006). As can be seen in Table 5, the three-factor correlated model was a significantly better solution over the three factor-uncorrelated model, and provided the best fit to the data for both the analysis and the validation samples. This offers strong evidence that the three factor correlated model provided a better approximation to the data than the other models tested and, as such, could sensibly be used to examine innovation capability in a PSF context.

5. Discussion and conclusions

The current study makes several significant contributions to theory and practice through the use of an integrated multi-method approach, and rigorous scale development procedures to empirically validate a psychometrically sound and parsimonious innovation capability scale in a professional service context. The study contributes to the service and capability-based competitive advantage literatures in several important ways.

Firstly, the study answers recent calls to measure the ways through which service firms innovate (Ostrom et al., 2010), since evidence suggests the notion of innovation, which evolved based on concepts developed in manufacturing and high-technology industries, may not be the same in service industries (Hipp & Grupp, 2005). For example, a number of authors have suggested that there is a greater emphasis on non-technological innovation in the service sector (e.g., management processes, marketing, customized solutions and the use of human capital) (Djellal & Gallouj, 2001; Drejer, 2004).

The present findings support this contention and provide a more focused understanding of the service innovation capability construct. Informed by insights from prior research and 37 depth interviews

**Table 5**  
Confirmatory factor analysis results for the competing models.

Model	$\chi^2$	df	$\Delta\chi^2$	$\Delta df$	Normed $\chi^2$	TLI	CFI	GFI	SRMR
<i>Analysis sample (n = 255)</i>									
Null	6538.74	78	–	–	83.83	0.00	0.00	0.20	0.53
One-factor	845.26	65	5693.48*	13	13	0.75	0.79	0.66	0.08
Three-factor uncorrelated	437.41	65	407.85*	0	6.73	0.82	0.85	0.79	0.40
Three-factor correlated	114.96	62	322.45*	3	1.85	0.98	0.98	0.94	0.03
<i>Validation sample (n = 208)</i>									
Null	5714.22	78	–	–	73.26	0.00	0.00	0.19	0.55
One-factor	858.05	65	4856.17*	13	13.20	0.73	0.78	0.61	0.09
Three-factor uncorrelated	376.29	65	481.76*	0	5.79	0.82	0.85	0.78	0.42
Three-factor correlated	101.33	62	274.96*	3	1.63	0.98	0.98	0.93	0.03

$\chi^2$  = chi-square; df = degrees of freedom;  $\Delta\chi^2$  = chi-square difference statistic;  $\Delta df$  = difference in degrees of freedom; Normed  $\chi^2$  =  $\chi^2/df$ ; TLI = Tucker–Lewis index; CFI = comparative fit index; GFI = goodness of fit index; SRMR = standardized root mean residual.

\*  $p < 0.05$ .



with professional service providers, we conceptualized, constructed, refined and tested a multidimensional scale that measures PSFs' innovation capability. In the preliminary scale development stage we gained an in-depth insight into the range of dimensions of innovation capability in this specialized context, which formed the basis for the subsequent stages of scale development and refinement that used a large-scale web-based survey ( $n = 463$ ). The process led to the development of a three-dimensional (client-focused, marketing-focused and technology-focused), thirteen-item innovation capability scale that reflects the unique characteristics of PSFs' core responsibilities and activities.

The study provides a more detailed and contextually insightful conceptualization of innovation capability than what has previously been offered. The *client-focused innovation capability* dimension reflects a firm's ability to provide clients with services and products that offer unique benefits superior to those of competitors, and an ability to solve clients' problems in innovative ways. This conceptualization is broader than previously suggested product innovation capability measures. The *marketing-focused innovation capability* dimension reflects a firm's ability to develop and implement novel promotional approaches, and innovative marketing programs; while *technology-focused innovation capability* reflects a firm's ability to adopt new software, integrated systems and technology, and an ability to innovate with new software and technology in order to keep ahead of the market.

The client-focused innovation capability dimension is important in a professional service context, and links three types of innovation capability dimensions (service and product, problem solutions, and behavioral innovation capability). In prior research, innovation capability measures have often been based on dichotomous conceptualizations, such as product or operational process (e.g., [Chen, 2009](#)), radical or incremental (e.g., [Subramaniam & Youndt, 2005](#)), and administrative or technological (e.g., [Tuominen & Hyvönen, 2004](#)). The present study suggests that these conceptualizations are not appropriate for PSFs and that measuring service firms' innovation capability based on scales developed in other industries does not allow an accurate measurement of innovation capability in this specialized context.

The prominence of the marketing-focused innovation capability dimension is also an important contribution to our understanding of the innovation capability construct in the professional service sector. Historically, PSFs have regarded marketing as inappropriate, unprofessional and undignified for "professionals" ([Harris & O'Malley, 2000](#); [Shepherd & Helms, 1996](#)). However, as was evident from the depth interviews, having an ability to implement innovative marketing programs is increasingly viewed as a way to stay ahead of the competition. The interactive nature of professional services suggests that front-line employees not only have the responsibility in their primary role of providing technical advice to clients, but are also responsible for many marketing activities ([Laing & McKee, 2000](#)).

Technology-focused innovation capability has typically been integrated with product and operational process innovation capability. Integrating this capability dimension into service or product and operational process innovation capability in service contexts may obscure the relevance of each of these dimensions. The depth interviews and the exploratory and confirmatory factor analyses support this assertion, as technology-focused innovation capability was found to be a distinct and separate dimension.

The operational process and strategy innovation capability dimensions were not included in the measurement of PSF's innovation capability, which is significant, as prior research has examined product and process innovation capability. Operational process innovation capability is often seen as a sub-element of technical innovation capability that integrates products and processes through technology (e.g., [Damanpour, 1991](#); [Wang & Ahmed, 2004](#)), and is regarded as a "second-order" type of innovation capability, compared to the "more glamorous product innovation capability" ([Reichstein & Salter, 2006, p. 653](#)).

The strategy innovation capability dimension appears to be less prominent in professional service contexts. Strategy innovation capability is the discovery of a fundamentally different strategy or way to compete in an existing industry ([Markides & Anderson, 2006](#)), or the development of new competitive strategies that create value for a firm ([Besanko, Dranove, & Shanley, 2007](#)). Professional services are delivered within the constraints of professional norms of conduct ([Løwendahl, 1997](#)), are governed by a code of professional ethics, and are highly regulated ([Stumpf, Doh, & Clark, 2002](#)). The degree to which PSFs have an ability to "implement innovative business strategies" or to "compete in fundamentally different ways" may be hampered by such regulations and constraints. During the depth interviews, a number of participants suggested restrictions imposed by government bodies hampered the degree to which their firms were able to engage in some activities. For instance, a consultant engineer in a metropolitan area suggested that local authorities were very staid and reluctant to trial innovative techniques the firm had developed.

The findings from the current study support the argument that, due to the unique characteristics of service firms, measures developed in other contexts may not capture PSF's innovation capability. For instance, during the item reduction and EFA stage, a number of operational process innovation capability items were found to be related to the client-focused innovation capability dimension ([Table 2](#)), although these items were dropped during the stricter CFA stage of the scale development process. Even so, having an ability to "improvise on new methods", "introduce new service delivery processes", and "develop new processes to deliver services and products" may be integrated into the client-focused innovation capability dimension during the process of providing clients with innovative solutions, products and services. Additionally, operational process innovation capability may be subsumed through technology-focused innovation capability, whereby a firm's processes are integrated with an ability to adopt and innovate with new software, technology and integrated systems. The difficulty in clearly distinguishing between product and operational process innovation capability in service contexts highlights the importance of developing distinct measures for this sector.

The study also answers calls in the capability-based competitive literature for research into the capabilities specific to contexts, and for careful empirical estimation of their significance and value ([Ethiraj et al., 2005](#)). Our study supports [Ethiraj et al.'s \(2005\)](#) findings that firm capabilities are often context-specific. In a professional service context, the innovation capability construct does not only capture product or operational process innovation capability, but is clearly multidimensional, reflecting the unique characteristics of professional service firms' core responsibilities and activities. In increasingly competitive markets, a PSF's innovation capability may be critical to it achieving superior performance and competitive advantage. Importantly, through the development of a scale to capture innovation capability in the specialized PSF context, we have laid the foundation for future capability-based research to assess the drivers and performance outcomes of this distinctive capability.

## 6. Managerial implications

Overall, the pattern of results demonstrates the unique innovation capability of PSFs. The innovation capability scale has thirteen items that measure three dimensions and, hence, is an efficient way to assess a firm's innovation capability. The measure provides managers with a better understanding of ways to facilitate innovation capability in a more effective manner. For example, the measurement of a firm's innovation capability should assist management in assessing priority innovation areas that need to be addressed, and allow them to respond to challenges posed by the types of innovation capability that need to be improved. In addition, identifying the innovation capability dimensions that best enhance performance should assist management to identify and implement appropriate training programs to facilitate effective innovation related activities. As such, the scale



has practical relevance because it can assist managers estimate the economic significance of different innovation capability aspects. Further, measuring innovation capability at a micro level provides managers with a finer-grained picture as to where and how their firm needs to improve its innovation capability.

## 7. Limitations and future research

The findings should be considered in light of a number of limitations. First, measures for all of the constructs were collected from the same source and, therefore, may be subject to respondents' perceptions. We attempted to minimize this limitation during the scale development process through depth interviews with professional service providers, so as to determine the specific items that reveal PSFs' innovation-related capability, and not what managers believed they ought to be. Further, the rigorous scale development procedures used were designed to provide evidence of the scale's sound psychometric properties. Second, the study was conducted in a PSF context and, hence, the findings may not be generalizable to other service contexts.

Although these limitations are acknowledged, they do not detract from the significance of the research findings, but provide a foundation for future research. The paper provides some rich insights into PSFs' innovation capability and moves the field of innovation capability forward, encouraging further research in a number of areas. First, the development of an innovation capability scale for a specific context has laid the foundation for future research into assessing possible antecedents and consequences of innovation capability in knowledge-intensive service contexts. Understanding the drivers of innovation capability will enhance our understanding of the role innovation capability plays in PSFs. For example, organizational resources, such as market orientation (Atuahene-Gima, 2005), leadership and organizational learning (Aragon-Correa, Garcia-Morales, & Cordon-Pozo, 2007), creativity (Scott & Bruce, 1994; Sethi, Smith, & Park, 2001), and intellectual capital (Subramaniam & Youndt, 2005), positively influence organizational innovation. The capability-based theory of competitive advantage may provide a foundation for better understanding how firms develop these innovation capability dimensions and enhance our understanding of how firms adapt, learn and manage resources to improve their distinctive innovation capability.

Second, the benefits from pursuing these distinct types of innovation capability as part of a firm's overall competitive strategy should be assessed in terms of client, market and financial performance outcomes. For example, recent research suggests an ability to integrate and adopt technology at different life-cycle stages has an impact on financial performance outcomes (Heeley & Jacobson, 2008).

Third, although professional services have high credence qualities and are, therefore, difficult for clients to assess even after some use, future research should assess clients' perceptions of the effects of the specific dimensions of innovation capability. For example, client-focused innovation capability has the potential to influence client satisfaction, loyalty and retention, and future research from a client's, rather than a provider's perspective would provide interesting additional insights. Moreover, marketing-focused innovation capability has the potential to influence performance outcomes from a customer viewpoint and future research should investigate current and potential clients' perceptions of innovative marketing programs in this context.

Finally, given the little research on innovation in service contexts overall, future research across a number of service industries would help determine if the innovation capability dimensions and their performance outcomes are industry specific or are more generalizable. We encourage future research into these potentially fruitful areas.

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