Journal of Business Research 66 (2013) 1134–1142

Contents lists available at SciVerse ScienceDirect

Journal of Business Research

Innovation and business success: The mediating role of customer participation

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ARTICLE INFO

Article history:
Received November 2012
Accepted April 2013
Available online 30 March 2012

Keywords:
Innovation
Customer participation
Service quality
Firm performance

ABSTRACT

Innovation and the customer participation are central issues in research focusing on the performance of firms. However, the current literature offers little guidance on the extent of connection between firm innovation capabilities and customer participation and how they work together to enhance the quality of services and drive firm performance. Drawing on the literature focusing on firm capabilities and relationship management particularly customer participation, this study proposes that customer participation may account for the effects of service firm innovation capabilities (both technical and non-technical) on service quality. Empirical evidence from 259 firms supports this proposition. In addition, the study also finds that service quality positively enhances firm performance.

1. Introduction

Innovation and marketing are the two factors crucial to the firms' wealth creation (Drucker, 1973; Srinivasan, Pauwels, Silva-Risso, & Hanssens, 2009). The innovation literature proclaims the importance of innovation to firm success and frequently cites it as the key element of superior firm performance (Han, Kim, & Srivastava, 1998; Hurley & Hult, 1998; Weerawardena, O'Cass, & Julian, 2006). Within the innovation literature, researchers pay much attention to technical innovation (e.g. develop new services, service operations and technology). However, non-technical innovation (e.g. managerial, market, and marketing) while receiving less attention is as important as technical innovation in enhancing the quality of the firms' offerings and its ability to achieve superior performance (e.g., market share, sales, and profitability).

The marketing literature increasingly focuses on the interactions (e.g., dialog and/or participation) between firms and customers in efforts to create offerings of greater value for both parties. In particular, much of this literature centers on the merits of increasing the extent of active customer participation in service production and delivery (Auh, Bell, McLeod, & Shih, 2007; Yi, Nataraajan, & Gong, 2011). For example, customers who actively participate with firms are more likely to create customized offerings for themselves (Firat, Dholakia, & Venkatesh, 1995). Customer participation also enables firms to draw customers closer to in the pursuit of long-term and profitable relationships (Bendapudi & Leone, 2003; Payne, Storbacka, Frow, & Knox, 2009). More specifically, using customers' talents to deliver superior service could enhance productivity (Lovelock & Young, 1979) and be a means to achieve competitive advantage (Prahalad & Ramaswamy, 2004).

Customer participation refers to "the degree to which the customer is involved in producing and delivering the service" (Dabholkar, 1990, p. 484). In this context, the service is likely to be seen less as a finished, immutable offering and more a process into which customers can if they desire and the firms want immerse themselves and can provide inputs. Integrating customers into the firms' innovation process improves service quality, and market success, and as such is among top research priorities for 2008–2010 by Marketing Science Institute (Hoyer, Chandy, Dorotic, Krafft, & Singh, 2010). Achieving superior quality in service industries is of paramount importance because high service quality not only results in positive behavioral intentions from customers, but it ultimately drives improved market share, sales and greater profitability (Dagger & Sweeney, 2007).

Exploring the interrelationships between service innovation, customer participation and service quality is the motivation for this study. Recent research on innovation and customer participation offers little guidance on how a firms' innovation and customer participation work together to enhance service quality and firm performance. Indeed, a literature review reveals an absence from the organizational capability literature of any focus on the simultaneous examination of performance implications of firm innovation capabilities and customer participation. This point picks up a critical gap identified within the work of Newbert (2007) where no article within his list of empirical research investigates any form of innovation and customer participation as a vehicle for realizing firms' service quality outcomes or performance. This finding is particularly anomalous, given that the extant literature recognizes the important role innovation plays and given the increasing importance of product quality and customer participation in determining firm performance (Auh et al.,

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doi:10.1016/j.jbusres.2012.03.009

2007; Bendapudi & Leone, 2003; Branzei & Vertinsky, 2006; Dagger & Sweeney, 2007; Dong, Evans, & Zou, 2008; Fang, 2008; Prahalad & Ramaswamy, 2000).

This study contributes to research on innovation and customer participation by examining the contribution of both innovation and customer participation to enhancing firms' service quality and firm performance. Particularly, this study theorizes that customer participation may account for the effect of innovation capability on service quality, which in turn enhances firm performance. Fig. 1 presents a conceptual model that links innovation capability, customer participation, service quality, and firm performance together.

The remainder of the paper discusses the theoretical background addressing the key constructs and integrating the distinct and yet related bodies of literature on innovation capability (technical and non-technical), customer participation, service quality, and firm performance and proposes specific hypotheses. The paper then outlines the study design and administration, presents the results, and discusses the findings, implications and limitations and conclusions drawn from the study.

2. Theoretical development and hypotheses

2.1. Organizational capability view of innovation: the role of technical and non-technical innovation capabilities

Most of the literature that investigates the performance and economic impacts of innovation over the last few decades has a significant bias toward manufacturing (Ostrom, Bitner, Brown, & Burkhard, 2010; Paswan, D'Souza, & Zolfagharian, 2009). In much of the literature services is somewhat technically inferior or backward, with innovation playing only a marginal role in explaining the performance of this sector and the competitive strategies of service firms. Importantly, despite the existence of a growing body of literature emphasizing the role that non-technical innovation plays in services, the extant literature knows very little about whether non-technical innovation complements technical innovations in the service firms' performance achievements. Further, the relative importance of technical and non-technical innovations along with other organizational change agents as drivers of firms' performances is important and can be set within the domain of the organizational capability theory of the firm.

Interfirm performance differences depend on capabilities that incorporate sets of specific, identifiable processes, or commonly accepted best practices (Branzei & Vertinsky, 2006; Eisenhardt & Martin, 2000). "Capabilities are routines through which managers alter their resource base—acquire and shed resources, integrate them together, and recombine them" (Eisenhardt & Martin, 2000, p. 1107). Being deeply rooted in routines and practices, capabilities erect barriers to imitation from competitors and, as a result, developing appropriate capabilities may help firms establish sustainable competitive advantage and maximize their growth and performance (DeSarbo, Di Benedetto, & Song, 2007). The key then is that a firm must have access to appropriate capabilities, which refer to its capacity to deploy its resources (Amit & Schoemaker, 1993). Variance in capabilities or the possession of specific capabilities that suit the firms' competitive environment may result in differential effectiveness at generating customer engagement opportunities and service quality.

The organizational capability view of innovation holds that firms do not merely compete on new products or services, but rather on their own unique capabilities underlying their product market activities (Barney, 1991; Liao, Jill, Kickul, & Ma, 2009; Prahalad & Hamel, 1990). In particular, the presence of different organizational capabilities positively influences product performance (e.g. service quality). A capability is the proficiency of a bundle of interrelated routines within firms for performing specific tasks. Capabilities do not reside in individual routines but emerge from the integration of multiple interrelated routines and processes. This implies that capabilities are built through managerial choices in identifying, developing and integrating routines and processes to undertake specific functionally oriented behaviors. This study adopts a view that innovation capability manifested in innovation-related business processes (technical and non-technical), is something beyond resources, and are valuable inputs for firms to develop and maintain competitive advantage.

Drawing on socio-technical system theory, this study emphasizes two types of innovation: technical and non-technical (Damanpour, 1991; Damanpour, Walker, & Avellaneda, 2009; Jiménez-Jiménez & Sanz-Valle, 2011). In fact, to help maintain and improve performance, firms may organize their innovation efforts through the technical system and social system (Hurley & Hult, 1998). Drawing upon the above arguments, innovation capability is embedded within the application of knowledge and skills embedded within the routines and processes of the firm to perform innovation activities pertaining to technical innovations (develop new services, service operations and technology) and non-technical innovations (managerial, market, and marketing). Therefore, this study adopts the view of innovation by Damanpour (1991) as its theoretical base where innovation is the adoption of an idea or behavior new to the adopting entity, which involves all dimensions of firm activities, such as a new

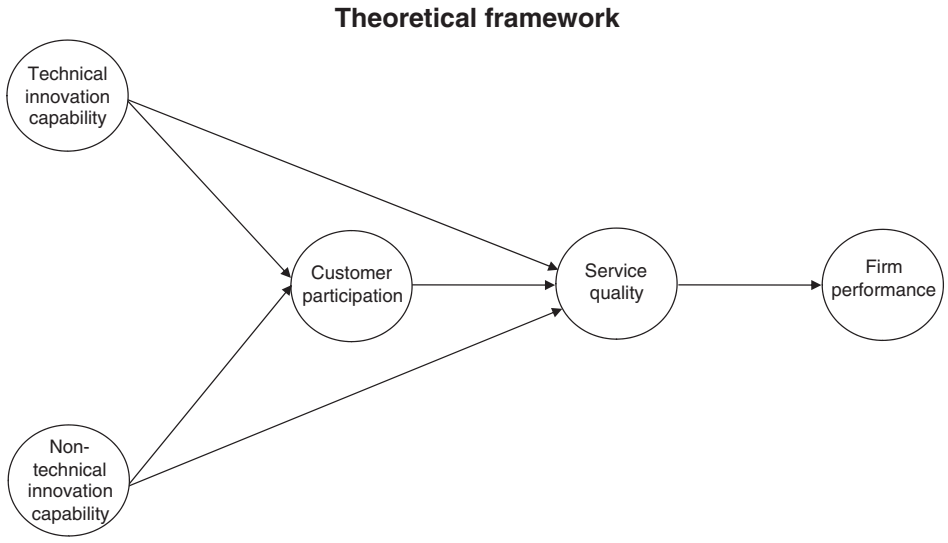

Fig. 1. Theoretical framework.

product or service, a new production process technology, a new structure or administrative system, and a new plan or program within the firm. This study focuses on service innovation capabilities consisting of two types of innovation: service and process encapsulated within the context of technical innovation and administrative innovation via marketing and management encapsulated within the context of non-technical innovation. For example, through product innovations, which are mainly driven by the marketplace (e.g. customers and competitors) firms can differentiate their outputs and increase their service quality (Damanpour et al., 2009). The firms' engagement in process innovations, which are mainly driven by productivity, enables firms to improve product quality and production efficiency (Faria & Lima, 2009).

2.2. Relationship management: role of customer participation

Many firms increasingly focus their business practices toward actively encouraging customers to take on more active roles in the production of services (Auh et al., 2007; DeSarbo, Jedidi, & Sinha, 2001; Yi et al., 2011). Customer participation per se is not new, what is new is the recognition that encouraging customers participate with firms is the next frontier in competitive effectiveness (Bendapudi & Leone, 2003) and ultimately a way to gain marketplace advantages over rivals. Recently, some advocates see co-opting customer competence as a competitive strategy (Prahalad & Ramaswamy, 2000). This shift in the perspective of firms to viewing customers as active participants with firms rather than as a passive audience is captured in the movement away from business focusing on the philosophy of "What can we do for you?" to a stronger focus on "What can you do with us?" (Wind & Rangaswamy, 2000). Engaging customers as active participants in the firms service creation and delivery process is beneficial to both firms and customers. For example, customer participation can lower costs for firms and in turn customers can expect a reduction in price (Auh et al., 2007). In addition, firms can also customize their offerings to customers who have a personal interface with them and provide direct input into the design and delivery of the final service (Auh et al., 2007). This study suggests that customer participation leads to improved service quality, which in turn leads to more favorable assessments of the firms' service and increases customers' intentions to spend and actual spending with the firm, leading ultimately to improved firm performance.

This study suggest that customer participation represents "what firms can do with customers" to co-create value (Bendapudi & Leone, 2003; Ravald & Gronroos, 1996). Customers may seek and find it beneficial to exercise their influence in various parts of the business system to co-construct their own unique personalized purchase and consumption experiences (Prahalad & Ramaswamy, 2004). Value is not simply added in, in the sense of "what can we do for you", but is mutually co-created among firms and customers via business approach resting on "what can you do with us" and is a firm's response to customers' unique and changing needs (Ramirez, 1999; Vargo & Lusch, 2004). The customer is always a co-creator of value according to Vargo and Lusch (2004) and "the goal is not to create value for customers but to mobilize customers to create their own value from the company's various offerings" (Normann & Ramirez, 1993, p. 69). The emergence of firm–customer interaction shows that many firms actively involve their customers in an array of service activities such as using customers' labor to help design the service, deliver the service and the like. Such participation indicates that their role is not to consume value but to help create it (Normann & Ramirez, 1993). As such, customers are increasingly being encouraged to actively collaborate with firms to co-create customized consumption experiences (Bendapudi & Leone, 2003; Payne, Storbacka, & Frow, 2008; Prahalad & Ramaswamy, 2004). In the context of the customer participation, both the customer and the firm are learning from each other (Jaworski & Kohli, 2006) and find mutually beneficial outcomes from their interaction (Ramirez, 1999). However, to the extent that customer participation proves desirable for a firm, the firm must come to understand its facilitating factors and those factors appear to be wide-ranging, but a critical one is innovation.

2.3. Hypotheses development

Service quality is a typical operational performance measure (Tatikonda & Montoya-Weiss, 2001). Importantly, obtaining superiority in quality is essential for many firms to deliver superior customer value (Menon, Jaworski, & Kohli, 1997). Firms can achieve this goal by focusing their efforts on technical innovations and non-technical innovations. The extant literature documents that innovation capability enables firms to achieve superior performance (Damanpour & Evan, 1984; Weerawardena & O'Cass, 2004). In the context of services, however, superiority in service quality and firm performance cannot be obtained directly via innovation capability without customer participation as an essential input of the design and delivery of final service. Customers play an interesting and complex role in the service organization, since they not only receive and consume the service but also serve as an important component in its innovation (Normann, 1984). When thinking of serving customers firms cannot just offer them new services and think of the transaction. Instead, firms need to also build an enduring relationship to enhance service performance outcomes. In this sense, customer participation is the glue that links innovation and service quality performance.

Innovation capability and customer participation are closely associated. Firms that place an emphasis on innovation are more likely to try to improve the fit between their innovative offerings and customer needs. A closer look at the service innovation literature shows a significant difference between successes and failures in service innovations with greater customer participation in successful offerings compared to those that were unsuccessful (Martin & Horne, 1993; Martin, Horne, & Schultz, 1999). Indeed, firms that encourage customer participation can capitalize on customer competencies during the course of their innovation activities (Blazevic & Lievens, 2008). Through customer participation, firms are able to learn, meet customer needs better, and improve performance (Prahalad & Ramaswamy, 2004). Importantly, the effectiveness of innovation depends upon how customers deal with innovation. As soon as an innovation transforms the frontline service production process, it is likely to modify how customers participate (Abramovici & Bancel-Charensol, 2004). To do so, firms can develop an on-going relationship with customers and work closely with customers to ensure offerings meet customer requirements. In this sense customers are viewed as active partners in the creation of innovative offerings. Importantly, innovation capability also encourages firms to seek customer participation opportunities through innovation experience environments. With new products and services like networked Handycam, CyberShot cameras, and the PercasTV personal-casting service, Sony has built an experience environment where virtually anybody can be a content creator. Such superior tangible and intangible innovative offerings (e.g. Handycam and personal content creation environment) rest on a distinctive capability in product and process (e.g. display technology and epic-making production systems). Consequently, to achieve superior service quality for the customer, firms should be able to develop new ways (e.g. managerial and marketing innovations) to motivate customers to participate, as well as ways to successfully monitor and manage the process along the way. As such, firms possessing a higher level of capabilities pertaining to technical and non-technical innovations appear to facilitate customer participation.

Quality is a relatively global value judgment and it depends on customers' experience with the focal object (Molinari, Abratt, & Dion, 2008; Schneider & Bowen, 1995). Voss, Roth, Rosenzweig, Blackmon, and Chase (2004) contend two different perspectives on service quality, one identified from the marketing lens which

addresses the customer's perspective and the other from an operations lens addressing the firm's perspective. From the customer's perspective, service quality is determined by the difference between the customer's expectations and perceptions (Zeithaml, Berry, & Parasuraman, 1990). However, the measurement of service quality is complex because a zone of tolerance exists between the normative and the minimum levels of customer expectation (Voss et al., 2004). Drawing on the operations management literature, this study defines service quality as "either of high service quality or not, based on the meeting or exceeding of certain established service standards" (Voss et al., 2004, p. 213).

As customers are increasingly well-informed, connected and value-conscious, this study suggests that focusing on customer participation helps significantly improve innovation processes and enhance operational outcomes such as service quality. Indeed, as an external resource, customers can help facilitate innovation processes (Bacon, Beckman, Mowery, & Wilson, 1994). Customer participation reflects a firm's capacity to develop participation based relationships that work toward achieving better operational outcomes. At its core, customer participation enables firms and customers to obtain greater benefits simultaneously from their interaction. In particular, customer participation allows firms to interact with customers to design offerings that meet unique and changing needs. Further, via supporting systems firms can help customers get more value out of their consumption experiences thereby increasing product performance outcomes (e.g., service quality). By working together both customers and firms achieve desirable outcomes in relation to marketplace offerings and minimize wastage, develop more targeted services that meet specific needs better and obtain higher quality outcomes.

Importantly, customer participation must be geared toward specific outcomes desired by both the firm and the customer. Customer participation enables the service firm to customize its offerings to better meet customers' needs. The personal interface between the customer and firm thus represents an important element of a service delivery process through which customers provide direct input into the production of the final service (Auh et al., 2007). Many services are defined by a high degree of coupling, interdependence, and information richness (Kellogg & Chase, 1995). These characteristics raise the issue of working with customers to create the service offering, and thus the firms' ability to manage the service delivery process via customer participation as a critical delivery mechanism. Customer participation allows firms' to provide mechanisms to connect with the customer to engage in beneficial exchanges in a more effective and efficient and targeted manner through a constructive dialog. If service quality is the desired operational outcome, customer participation has the capacity to enhance the benefits of innovation. It is this capability that enhances firms' ability to achieve desired service quality outcomes for its targeted customers. Thus, this study hypothesizes that:

Hypothesis 1. Customer participation mediates the relationship between technical innovation capability and service quality.

Hypothesis 2. Customer participation mediates the relationship between non-technical innovation capability and service quality.

2.3.1. Service quality and firm performance

At the market level, firm performance resides in the marketplace strength of a firm achieving its objectives in terms of performance indicators such as, sales, profitability, market share, and the like. The extant literature generally views performance within the context of the rents a firm accrues as a result of the strategies it implements (Rumelt, Schendel, & Teece, 1994). This study conceive and operationalize performance via an adapted form of Delaney and Huselid's (1996) widely used market performance scale (Perry-Smith & Blum, 2000; Richard, 2000), a subjective scale that includes both financial (sales, profitability) and nonfinancial (marketing, market share) indicators.

As such, this study defines firm performance as a measurement of the firms' relative success in the marketplace via a range of financial and non-financial performance indicators. Specifically, total sales and profitability are key financial performance indicators, while market share is a non-financial or operational performance indicator that is widely used in strategic marketing (e.g. Baker & Sinkula, 1999). A firm's total sales are often used as an indicator of firm performance, as it reflects the level of direct earnings from customers. Prior research on firm performance uses total sales and profitability as the two common financial indicators of firm performance (Baker & Sinkula, 1999; Newbert, 2008).

Market share refers to the relative measurement of a firm success in the marketplace. For example, market share is a meaningful indicator of firm success, as success depends upon high levels of market share when set within the non-financial domain of firm performance (Baker & Sinkula, 1999; Venkatraman & Ramanujam, 1986). Indeed, successful firms such as Coca-Cola, IBM, and Sony are leading players that achieve high levels of market share in their industries.

Importantly, a firm providing customers with high-quality services is likely to achieve superiority in firm performance via greater profitability, market share, and sales growth. Indeed, with high quality services, firms are able to charge premium prices, which leads to higher profit (Zhou, Li, Zhou, & Su, 2008). Importantly, high quality services enable firms to improve their sale volume and higher quality can result in higher market share. Adopting the premise of Phillips, Chang, and Buzzell (1983) that quality is a key driver of customer preference, and therefore, relative market share this study also take the view that service quality is a key driver of these important outcomes. Thus, this study hypothesizes that

Hypothesis 3. Service quality is positively related to firm performance.

3. Method

3.1. Sample and procedure

To carry out the empirical study, this study used the data drawn from a survey of services firms in Australia. The participating firms employed at least 50 full-time employees. This selection criterion eliminates very small firms that according to Ottum and Moore (1997) and Yilmaz, Alpkan, and Ergun (2005) lacked distinct functional departments; and importantly the current sample otherwise captured a wide range of company sizes (Stock and Zacharias, 2010). To avoid heterogeneity due to firm size, this study selected a sampling frame of 1000 services firms with more than 50 full-time employees (Yilmaz et al., 2005) from a commercial mailing list of services firms operating in 20 different two-digit Standard Industrial Classification code industries (20, 30, 40). Furthermore, though firms with 200 or more employees represent around .3% of firms in the Australian economy (ABS, 2007), this segment is important for this study, as supported by existing studies in the field of innovation management (e.g. Atuahene-Gima, 1996; Yadav, Prabhu, & Chandy, 2007). Also, because an object's ratings cannot be divorced from its perceiver, this study selected the most knowledgeable informants within each firm who possessed the expertise to report on each construct. Specifically, marketing and non-marketing managers when marketing managers were not available (such as service operations managers) were the key informants. This selection provides highly relevant perspectives in the context of innovations (Danneels & Kleinschmidt, 2001).

The research team contacted respondents in the sample via telephone and asked them to fill out an online survey. Respondents were also questioned about their knowledge of innovation and customer participation activities of their firms to ensure they were

suitable respondents and asked about their confidence to complete the survey. The research team sent a reminder email to the respondents one week after the first one. Non-response bias did not appear to be a major concern as the research team found no significant differences between those firms who responded early and those who responded late with respect to key measures. To ensure informant competence, the research team prequalified each respondent by phone and ensured that the respondent held a managerial role that involved ongoing evaluation of services delivery, innovation and service operations activities. The research team also pre-screened these firms to ensure they had formal monitoring of service quality.

In total, the research team received 155 usable surveys, producing a response rate of 15.5%. The sample consisted of 74.2% of firms operating within the domestic market, 25.8% in international markets. The firms ranged in size, in terms of people employed fulltime, from 50 employees to a maximum of 35,520 employees (median = 2278 employees). In terms of respondents, 64.5% of respondents were marketing managers, 35.5% non-marketing managers (service operations managers etc.), with all managers holding senior managerial positions.

3.2. Measurement development process

This study followed the scale development and testing procedures suggested by Hinkin (1995). The literature on innovation, customer participation, service quality and firm performance (e.g., Aragón-Correa, Garcia-Morales, & Cordón-Pozo, 2007; Chiesa, Coughlan, & Voss, 1996; Moorman & Rust, 1999; Newbert, 2008; Ngo & O'Cass, 2009; Ramaswami, Srivastava, & Bhargava, 2009; Vorhies & Morgan, 2003; Weerawardena & O'Cass, 2004; Zhou et al., 2008) was a guide to generate and refine the scales. This study generated a pool of items that tapped the domain of each construct. To establish face validity, the study provided six senior academic experts from different universities who possessed expertise in the area of innovation, service quality and customer participation with the construct definitions, corresponding items, and a set of instructions for judging (c.f. DeSarbo et al., 2001). The expert judges rated each item as, *not representative*, *somewhat representative*, or *very representative* to the construct definition. After receiving the expert-judges' feedback, decisions about which items to delete or keep were based on a three-stage procedure: a synthesis of the sumscore approach and the complete approach increasing in level of sophistication at each stage was adopted resulting in a draft set of items.

The study pretested the draft survey with group of senior executives from service firms (c.f. DeSarbo et al., 2001) and asked them to complete the draft questionnaire. Upon completion discussions were held with them about the items in the questionnaire focusing on item comprehension, logic, and relevance. Specifically, the study asked these executives whether they could think of more than one way to interpret each item and to report these interpretations, and explain why they responded the way they did on each item. Having completed the in-depth interviews with executives, the development of the measures resulted in the final set of items each of the key constructs along with firmographics.

3.3. Measures

Innovation capability consists of eight items capturing two components (four items for technical innovation and four items for non-technical innovation). These items refer to the application of knowledge and skills to engage in *technical innovations* (develop new services, service operations and technology) and *non-technical innovations* (managerial, market, and marketing) generating from the literature (Aragón-Correa et al., 2007; Chiesa et al., 1996; Weerawardena & O'Cass, 2004). This construct was measured on a seven-point scale with scale poles ranging from *not at all* to *extensively*.

Adapting from Ngo and O'Cass (2009), this study measured *customer participation* using a six-item scale capturing a firm's interaction with customers to co-construct the offering. *Service quality* was measured using a three-item scale adapted from Zhou et al. (2008). Both constructs were measured on a seven-point scale with scale poles ranging from *strongly disagree* to *strongly agree*. *Firm performance* was measured via a three-item scale. In particular, indicators of firm performance were the relative total sales, profitability, and market share of a firm based of established goals set for the firm. These items were adapted from Moorman and Rust (1999), Vorhies and Morgan (2003), Ramaswami et al. (2009), and Newbert (2008). This construct was measured on a seven-point Likert scale with scale poles ranging from *very poor* to *very good*. This study included *firm size* as a control variable to ensure that service quality and firm performance were not confounded with firm size. Firm size is indicated by the logarithm of the number of employees.

4. Analysis and results

4.1. Measurement validation

Table 1 reports the psychometric properties of the measures. Reliability is acceptable as all composite reliabilities, ranging from 0.86 to 0.93, are above the cut-off value of 0.70. Average variance extracted (AVE) values for all constructs, ranging from 0.68 to 0.76, were above the 0.50 cut-off value. Convergent validity of the constructs is acceptable as the loadings of items on their corresponding construct were above the cut-off value of 0.70 (Chin, 1998; Hulland, 1999).

The study then assessed discriminant validity of the key constructs. Following Fornell and Larcker (1981), the square roots of the AVE values were consistently greater than all corresponding correlations as shown in Table 2. This result shows that each construct in the model shares more variance with its corresponding measures than it shares with other constructs in the model. In addition, O'Cass and Ngo (2007) suggest that discriminant validity is evident when the correlation between two constructs is not higher than their respective reliability. As shown in Table 2, no individual correlations (from 0.25 to 0.49) in the off-diagonal entries are higher than their respective reliabilities (0.86 to 0.93). Accordingly, within the study all constructs exhibit satisfactory discriminant validity.

Next, the study examined possible common method bias effects that may lead to spurious relationships among the variables (Podsakoff, MacKenzie, Podsakoff, & Lee, 2003). Initially, a Harman's single-factor test shows that no single factor accounted for the majority of the variance (the first factor accounted for 37% of the 73% explained variance). Following Lindell and Whitney (2001) and Malhotra, Kim, and Patil (2006), the study then employed the marker-variable technique. To undertake this test market type (export versus domestic) was selected as a marker variable to control for common method variance ($r_M = 0.05$, $p = 0.57$). The mean change in correlations of the five key constructs ($r_U - r_A$) when partialling out the effect of r_M was 0.03, providing further evidence that common method bias was not present.

4.2. Hypothesis testing

The study used Partial Least Squares (PLS), specifically PLS-GRAPH v.3.00 to estimate both the main and mediation effects stated in the hypotheses (and shown in Fig. 1). PLS does not require restrictive assumptions about the population or scale of measurement (Chin, 1998; Fornell & Bookstein, 1982; Tenenhaus, Vinzi, Chaltelin, & Lauro, 2005). PLS is more appropriate for theory development research (Barclay, Higgins, & Thompson, 1995) and represents a well-established method for estimating complex models (Fornell & Cha, 1994). In Hypotheses 1 and 2, the study theorized that customer participation mediates the relationships between the firms' technical

Table 1
Measurement model results.

Constructs and manifest variables	Mean	SD	Loading
Technical innovation capability (TIC) *AVE = .73 Composite Reliability = .92* (adapted from Aragón-Correa et al., 2007; Chiesa et al., 1996; Weerawardena & O'Cass, 2004; *7-point scale 1 = "much worse than competitors" and 7 = "much better than competitors"*)			
Please rate your business unit, relative to your major competitors in terms of its technical innovation capabilities over the past year in the following areas			
1. Use knowledge to engage in technical innovations (e.g. new services, service operations and technology) (TIC1)	5.07	1.42	.93
2. Use skills to engage in technical innovations (e.g. new services, service operations and technology) (TIC2)	4.96	1.44	.90
3. Services innovations (TIC3)	4.67	1.45	.83
4. Service operations and technology (TIC4)	4.18	1.54	.78
Non-technical innovation capability (NTIC) *AVE = .71 Composite Reliability = .92* (adapted from Aragón-Correa et al., 2007; Chiesa et al., 1996; Weerawardena & O'Cass, 2004; *7-point scale 1 = "much worse than competitors" and 7 = "much better than competitors")*			
Please rate your business unit, relative to your major competitors in terms of its non-technical innovation capabilities over the past year in the following areas			
1. Use knowledge to engage in non-technical innovation (e.g. managerial, market, marketing) (NTIC1)	4.81	1.36	.84
2. Use skills to engage in non-technical innovation (e.g. managerial, market, marketing) (NTIC2)	4.80	1.39	.84
3. Managerial innovations (NTIC3)	4.25	1.47	.87
4. Market innovations (NTIC4)	4.28	1.47	.82
5. Marketing innovations (NTIC5)	4.48	1.48	.82
Customer Participation (CP) *AVE = .69 Composite Reliability = .93* (adapted from Ngo & O'Cass, 2009; *7-point scale 1 = "strong disagree" and 7 = "strong agree"*)			
Please indicate the extent to which you agree or disagree with each of the following items			
1. We work with customers to serve them better (CC1)	5.61	1.18	.72
2. We work with our customers to co-produce offerings that mobilize customers (CC2)	4.48	1.56	.87
3. We interact with customers to co-design offerings that meet customers' unique, changing needs (CC3)	4.82	1.56	.88
4. We provide supporting services in cooperation with customers (CC4)	4.92	1.45	.84
5. We co-opt customer involvement into our services (CC5)	4.52	1.56	.88
6. We work with customers to provide supporting systems to help them get more value out of our services (CC6)	4.77	1.49	.77
Service quality (SQ) *AVE = .76 Composite Reliability = .91* (adapted from Zhou et al., 2008; *7-point scale 1 = "strong disagree" and 7 = "strong agree"*)			
Please indicate the extent to which you agree or disagree with each of the following items			
1. We deliver quality services (SQ1)	5.88	0.95	.82
2. We deliver services that are exactly what customers want (SQ2)	5.17	1.24	.89
3. We deliver services that exceed customers' expectations (SQ3)	5.05	1.29	.90
Firm performance (FP) *AVE = .68 Composite Reliability = .86* (adapted from Moorman and Rust (1999); Vorhies and Morgan (2003), Ramaswami et al. (2009), and Newbert (2008); *7-point scale 1 = "strong disagree" and 7 = "strong agree"*)			
Please rate your business unit, relative to your major competitors in terms of its performance over the past year in the following areas			
1. Total sales (FP1)	5.00	1.33	.90
2. Market share (FP2)	4.93	1.58	.80
3. Profitability (FP3)	4.87	1.45	.76

innovation capability, non-technical innovation capability, and service quality. To test these hypotheses, the study followed the procedures suggested by Baron and Kenny's (1986) and estimated four models. In particular, to test Hypotheses 1 and 2, Model 1 and Model 2 were developed. As shown in Table 3, technical innovation capability positively influences service quality (Model 1, $\beta = 0.22$ t-value = 2.48) and customer participation (Model 2, $\beta = 0.31$ t-value = 3.85), which also positively influences service quality (Model 2, $\beta = 0.30$ t-value = 3.48). Comparing Models 1 and 2, the study found that the positive effect of technical innovation capability on service quality in Model 1 becomes insignificant in Model 2 ($\beta = 0.10$ t-value = 1.08). Thus, customer participation fully mediates the relationship between technical innovation capability and service quality, supporting Hypothesis 1.

To test Hypothesis 2, the study also compared Model 1 and Model 2. As shown in Table 3, non-technical innovation capability positively influences service quality (Model 1, $\beta = 0.30$ t-value = 3.11) and customer participation (Model 2, $\beta = 0.23$ t-value = 2.78), which also positively influences service quality (Model 2, $\beta = 0.24$ t-value = 2.30). Comparing Models 1 and 2, the study found that the positive effect of non-technical innovation capability on service quality in Model 1 becomes weaker in Model 2 ($\beta = 0.30$ vs. $\beta = 0.24$). Thus, customer participation partially mediates the relationship between non-technical innovation capability and service quality, supporting Hypothesis 2. Findings from Sobel's (1988) test also show that customer participation carried the effect of technical innovation capability and non-technical innovation capability on service quality. As shown in Table 3, firm size was not confounded with service quality and firm performance.

Next, the study examines the contribution of customer participation to the explanatory power of Model 2. Specifically, the increase in R^2 (ΔR^2) of service quality was 7% when including customer participation in the model. As shown in Table 3, $\Delta R^2_{\text{Model 1–2}}$ attributable to the mediating effect is statistically significant at <0.05.

In Hypothesis 3, the study predicted a positive relationship between service quality and firm performance. Results in Table 3 show that service quality has a positive relationship with firm performance (Model 3, $\beta = 0.30$ t-value = 3.76), supporting Hypothesis 3. Results in Table 3 also show that customer participation does not directly influence firm performance. This finding is in line with a theoretical contention that customer participation may result in opposite effects on speed to market (Fang, 2008). Specifically, customer participation activities have no or even negative impact on firm performance because bringing customers into collaboration activities may reduce the efficiency and increase the timelines. Interestingly, this study

Table 2
Construct-Level Measurement Statistics and Correlation Matrix.

Constructs	Internal consistency	TIC	NTIC	CP	PQ	FP
Technical innovation capability (TIC)	.92	**.85**				
Non-technical innovation capability (NTIC)	.92	.49	**.84**			
Customer participation (CP)	.93	.42	.38	**.83**		
Service quality (SQ)	.91	.33	.41	.45	**.87**	
Firm performance (FP)	.86	.31	.40	.25	.42	**.82**

Note: Diagonal entries show the square roots of average variance extracted, others represent correlation coefficients.

Table 3
Hypotheses 1, 2 and 3: structural equation parameter estimates (t-value).

Independent variables	Endogenous variables					
	Hypotheses 1 and 2			Hypothesis 3		
	Model 1	Model 2		Model 3		
	Service quality	Customer participation	Service quality	Customer participation	Service quality	Firm performance
Technical innovation capability	.22*	.31*	.10	.31**	.09	–
	(2.48)	(3.85)	(1.08)	(3.57)	(0.93)	
Non-technical innovation capability	.30*	.23*	.24*	.23*	.24*	–
	(3.11)	(2.78)	(2.30)	(2.38)	(2.47)	
Customer participation	–	–	.30*	–	.30*	0.00
			(3.48)		(3.86)	(0.00)
Service quality	–	–	–	–	–	.30*
						(3.76)
Firm size	.12	–	.08	–	.08	.11
	(1.77)		(1.13)		(1.13)	(1.73)
R-square	.21	.22	.28	.21	.27	.26

■ *Sobel t-Test*: Hypothesis 1: $SE_{\text{indirect effect}} = 0.037$; z-score = 2.51, $p < 0.01$; Hypothesis 2: $SE_{\text{indirect effect}} = 0.032$; z-score = 2.14, $p < 0.01$
■ *Test of increases in R^2 (ΔR^2) of firm performance*: $\Delta R^2_{\text{Model 1–2}} = 0.07^*$ ($F_{\text{Model 1–2, 1, 152}} = 14.78 > F_{\text{critical}} = 3.84$)

* $p < 0.01$.

found that service quality fully carried the effect of customer participation on firm performance.

5. Discussion and conclusion

The main purpose of this study is to advance the marketing literature by untangling the relationships among innovation capability, customer participation, service quality, and firm performance. More specifically, this study clarifies how and why customer participation matters in the contribution of innovation capability to service quality by showing its mediating role. This study finds that innovation capabilities affect service quality through customer participation. This new insight implies that firms that place their efforts on applying their knowledge and skills to implement innovation activities should engage in customer participation activities. This finding reinforces Bendapudi and Leone's (2003) recommendation that from a strategic viewpoint, firms may want to encourage participation in production by customers who have a strong relationship with the firm. This study's findings also show that customer participation enhances service quality. These results support the view that being a firm–customer linking asset, customer participation is a contingency variable that firms can embrace in managing innovation activities (Prahalad & Ramaswamy, 2004; Verona, Prandelli, & Sawhney, 2009). In particular, innovation capabilities are a necessary but not a sufficient condition for superiority in performance and the potential value of innovation capabilities is realized through effective customer participation.

Importantly, in line with Day (1994), this study's findings show that the combination of both inside–out and outside–in capabilities is essential to outperform competitors. Customer participation is an essential outside–in capability forging effective links with customers and realizing the value of innovation capabilities (inside–out capability). While both innovation capabilities and customer participation are important elements in managing service quality, this study offers the new insight that customer participation makes innovation capability a more valuable asset in achieving superiority in service quality.

Though not formally hypothesized, customer participation is not a significant driver of firm performance. A possible explanation is that customers may bring uncertainty to the service production process, which may hurt firm performance (Lengnick-Hall, 1996). However, an intriguing finding in this study is that service quality mediates the relationship between customer participation and firm performance. The indirect effect of customer participation on firm performance via service quality underscores the need for customer participation theory to embrace why and under what circumstances customers want to participate with firms, and what specialized skills and knowledge firms expect customers bring into customer participation activities. Apart from service quality, customer knowledge, experience, and motivation might be contingency factors that influence the relationship between customer participation and firm performance. Therefore, firms need to take these contingency factors into consideration in allocating necessary resources and capabilities to maximize the contribution of customer participation to firm performance.

This study calls on managers to consider the role of customer participation in realizing the value of innovation capabilities. The findings suggest that innovation capabilities should be developed and deployed with customer participation in mind. More specific, customer participation enables the conversion of innovation capabilities into superior service quality. Managers who pay attention to innovation as an end in and of itself may not achieve their intended objectives in performance, if they do not take advantage of customer input as a key resource. This study's findings also show that performance implication of customer participation is not directly established. As this study takes the firms perspective in looking at customer participation and its performance implication, managers should be aware of possible uncertainty that customers may bring into the service production process. For this reason, managers should understand the social and psychological behaviors and attitudes that might lead to customer participation. This study's findings also show that though technical innovations are important, managers need to pay equal attention to nontechnical innovation activities. These innovation capabilities appear to influence customer participation, which in turn affect service quality.

Like any research, the model in this study needs to be refined in further conceptual and empirical research. First, as this study uses data from a sample of firms in Australia, the generalization of the findings is limited. Future research may examine the model in other contexts, especially developing economies. Second, the focus on the combination of both inside–out (innovation) and outside–in (customer participation) is a limitation. Di Benedetto and Song (2003) find that certain capabilities will be more important to firms which fit certain strategic types. For example, prospectors may require greater relative inside–out capabilities than defenders that require greater relative outside–in capabilities. Future studies may examine the relative importance of innovation capabilities and customer participation across different strategic types such as prospectors, analyzers, and defenders. Finally, the current model is limited in its ability to explain the effectiveness of customer participation across different stages of technology. The utility of customers as active participants of service design and delivery process is contingent on the state of technology (e.g. mature vs. early) and the alignment of the

product line with the current customer base (Christensen, 1997; Nambisan, 2002). Future research should consider the contingent effect of the maturity of technology on the relationship between innovation capability, customer participation, service quality, and firm performance.

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