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## The role of openness in the fuzzy front-end of service innovation

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## ABSTRACT

The early stages of innovation involve high levels of uncertainty, leading to it being labelled as the “fuzzy-front end” (FFE). Although openness has been identified as pivotal to innovation performance in the open innovation literature, little effort has been put into exploring its role in the FFE. Specifically, this study examines ‘openness competence’ within the FFE—i.e., the ability of a FFE team to explore, gather and assimilate operant resources from external sources by means of external searches and inter-organisational partnerships. The aim is to investigate the impact of openness competence on front-end uncertainty reduction and service innovation success. Data were obtained from a survey of 122 IT-based service innovation projects implemented by IT service provider firms in Thailand. The results suggest that openness competence positively influences both the degree of uncertainty being reduced during the FFE and the overall success of service innovations. These findings offer several implications for research on open innovation and the FFE as well as encouragement to managers to apply a more open approach to the FFE of their service innovation projects.

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## 1. Introduction

Over the past few decades, the economic contributions from the service sector have surpassed those from the manufacturing sector. According to *Ostrom et al. (2010)*, services generate more than 70% of the gross domestic product (GDP) of many of the world’s most advanced economies. Similar trends have also been found in Asia (*Noland et al., 2012*). The literature on innovation in services has highlighted the importance of the early stages of innovation or the “fuzzy front-end” (FFE) to innovation success (e.g., *Alam, 2006; Magnusson, 2009; Ozer, 2007*).

In general, the FFE phase begins when an opportunity is first considered worthy of further ideation, exploration, and assessment and ends when a firm decides to invest in-or to terminate-the idea (*Khurana and Rosenthal, 1998*). Such an early phase is critical to innovation success for two reasons. First, the success or failure of an innovation project often depends on the quality of FFE outcomes (e.g., new service/product concepts, designs, project plans) (*Kim and Wilemon, 2002; Verworn, 2009; Verworn et al., 2008*). Although only 10% of the total cost of an innovation project is usually spent in the FFE, 70% of the total cost is committed at this phase (*Luoma et al., 2008*). Second, firms can improve their innovation process, with significant time and cost savings, if they

focus on the FFE rather than on the latter phases of innovation. This is because the cost of coming up with several potential ideas is considerably lower than the cost of developing any one idea (*Reid and De Brentani, 2004*). Nevertheless, the FFE has often been characterised as being unstructured, and involves high levels of uncertainty (*Khurana and Rosenthal, 1997, 1998*).

Scholars have suggested that, to generate commercially successful ideas, firms should acquire and assimilate information and knowledge from external sources (*Chen et al., 2011; Stevens, 2014*). Collaboration with customers (*Alam, 2006*) and other organisations, such as suppliers, competitors, universities, etc. in the early stages of their innovation process (*Kim and Wilemon, 2002; Tomlinson, 2010*) is recommended. These are consistent with the concept of “inbound open innovation” proposed by *Chesbrough (2003)*. He argues that firms can and should use external ideas (as well as internal ideas) to enhance their competitive advantage through innovation. Such openness underlies innovation success by allowing innovating firms to lower R&D cost, increase innovation productivity and newness, and to reduce time to market (*Chesbrough, 2003; Enkel et al., 2009; Huizingh, 2011*). The British Broadcasting Corporation (BBC) is an excellent example of how service firms can open up their front-end processes (*Forrester, 2011*). In 2005, the BBC launched a five year experimental initiative called “BBC Backstage”, which was based around the Backstage website offering a range of APIs for BBC’s services and contents. The aims were to encourage external developers to create innovative applications or programmes as well as

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connecting people both inside and outside of the organisation. As a result, around 160 ambitious and innovative prototypes were built and several became commercially successful (Kiss, 2011).

Outcomes and practices of innovation are sensitive to context and contingent on environmental conditions (Tether, 2005; Tidd and Hull, 2006). The literature seems to know a great deal about the FFE phase of innovation in the manufacturing sectors (e.g., Khurana and Rosenthal, 1997, 1998; Markham, 2013; Stevens, 2014), but comparatively few studies have addressed the issue of front-end openness in service contexts (e.g., Alam, 2006; Magnusson, 2009; Ozer, 2007). We argue that openness competence within the FFE is multi-dimensional; and that service innovation success may be contingent upon the level of openness competence possessed by the FFE team. This is because openness could be used to gather information and reduce uncertainty so that front-end decision makers are able to make informed decisions, which could ultimately lead to successful service innovations. Essentially, our study seeks to strengthen the understanding of openness competence within the FFE and its effects on front-end uncertainty reduction and the overall performance of service innovation projects. We contribute to open innovation and the FFE literature by answering the following two questions:

- RQ1: What is openness competence within the FFE? What are its key dimensions?
- RQ2: Does openness competence within the FFE contribute to front-end uncertainty reduction and service innovation success?

This article is organised as follows: the second section provides the research hypothesis that are founded in a review of the literature on service innovation, the FFE, uncertainty reduction and open innovation. Then, the data collection process is outlined. The fourth section presents the data analysis and findings. Next, the findings are discussed in the context of the extant literature, theoretical and managerial implications are identified, and limitations and avenues for future research are outlined. Conclusions are drawn in the final section.

## 2. Literature review and hypothesis formation

### 2.1. Service Innovation and the FFE of Innovation

Prior to the discussion about the FFE of service innovation, the definitions of the terms “service” and “service innovation” should be provided. In this study, we adopt the service-dominant (S–D) logic-based approach. The S–D logic argues that service is the basis of all economic exchange, while goods are only a distribution mechanism of service provision (Vargo and Lusch, 2008; Vargo and Lusch, 2004). The S–D logic defines service as “the application of specialised competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity and the entity itself” (Vargo and Lusch, 2004, p. 2). It highlights the importance of operant resources (resources that are capable of acting on other resources) over operand resources (resources on which an operation or act is performed to produce an effect) as the fundamental source of competitive advantage (Vargo and Lusch, 2004, 2008). The S–D logic encourages us to shift the focus from trying to create and/or deliver new products/services to finding new ways of co-solving customer problems (Michel et al., 2008).

The S–D logic is particularly suitable for a study focusing on opening up the innovation process because it highlights the importance of integration and transformation of operant resources lying outside of the innovating firm into complex and innovative service offerings (Vargo and Lusch, 2008). With the S–D logic in

mind, this study refers to “service innovation” as “a value proposition or an offering not previously available to the firm’s customers that requires either the innovating firm or the customer or both to renew, create, integrate and transform their collection of competences” (adapted from Lusch et al., 2007, p. 5).

Since service innovation success is the outcome variable of this study, a discussion on the definition of innovation success is essential. Innovation success is multifaceted and is difficult to measure (Griffin and Page, 1996; Menor and Roth, 2007; Menor et al., 2002). Various approaches have been used in the literature to measure innovation success at a project level. These include, *inter alia*, asking managers about their perception of whether an innovation project achieves its initial commercial success objectives (e.g., market share, ROI, sales and profit margin) and project efficiency (e.g., time and costs) (e.g., Knudsen and Mortensen, 2011; Melton and Hartline, 2010; Moenaert et al., 1995; Verworn, 2009; Verworn et al., 2008). Others have used more complex measures. For example, Griffin and Page (1996, p. 483) assessed innovation success in three dimensions: (1) customer-based success, (2) financial success, and (3) technical performance success. In service contexts, Menor et al. (2002, p. 141) suggested that service innovation performance involves both operational effectiveness (i.e., cost, effectiveness and speed) and market competitiveness (i.e., financial, competitiveness and service quality measures). Van Riel et al. (2004, p. 353) employed three success factors: (1) short term success (representing the most salient aspects of innovation success), (2) long-term success (factors associated with sustained competitive advantage) and (3) indirect success (preconditions for future success). While the more simple measures tend to emphasise the financial aspects of success, the more complex ones include non-financial aspects of success as well. Based upon this review, we propose that innovation success should be evaluated with respect to two dimensions: financial success in the short-term and non-financial success in the longer-term.

To be successful in service innovation, firms should use a systemic innovation process (de Jong and Vermeulen, 2003). Several models have been proposed in the existing literature (e.g., Alam and Perry, 2002; Avlonitis et al., 2001; Song et al., 2009). Inspired by Koen et al. (2001), we assert that, typically, the innovation process is comprised of three main phases: (1) FFE or pre-development, (2) development or project execution, and (3) commercialisation. The FFE, which is the main focus of this study, begins when an opportunity is first considered worthy of further ideation, exploration, and assessment. It ends when a firm decides to invest in or to terminate the idea (Khurana and Rosenthal, 1998). Key activities in the FFE phase of innovation are: opportunity identification, opportunity analysis, idea genesis, idea selection, and concept and technology development (Koen et al., 2001).

Kim and Wilemon (2002) proposed that the FFE phase shapes subsequent phases in three aspects. The first aspect involves project selection and product definition activities in the FFE. Two key deliverables are usually produced: selection of the right project and development of a well-defined product concept. The second dimension concerns the speed of the FFE process. Time is crucial to success of the FFE of service innovation due to today’s increasingly short product life cycles and intensified competition (Menor et al., 2002). Finally, the people dimension includes relationships between the FFE team members, senior management, other functions, and external parties. While the last two aspects concern efficiency (i.e., time and integration costs), the first seems to focus on effectiveness of the front-end process. Specifically, there is a distinction between “project success”, which, in the FFE context, is associated with generation, selection and conceptualisation of high-potential ideas; and “success of the project management effort”, which is often restricted to on time, within

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