

Effects of open innovation and knowledge-based dynamic capabilities on radical innovation: An empirical study

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ABSTRACT

Building on knowledge-based dynamic capabilities, this paper examines how knowledge capabilities influence the effectiveness of open innovation inbound and outbound activities on radical innovation performance. Based on a survey of 213 firms, the statistical results indicate that the effectiveness of open innovation inbound and outbound activities is contingent on the presence of knowledge acquisition capabilities and knowledge sharing capabilities. Specifically, a firm practicing inbound activities to strengthen radical innovation is more likely to benefit from knowledge sharing capabilities than from knowledge acquisition capabilities. In contrast, a firm practicing outbound activities is more likely to enhance radical innovation performance through knowledge acquisition capabilities than through knowledge sharing capabilities. Managerial implications and research contributions are provided, followed by a discussion of future research directions.

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1. Introduction

This study examines how knowledge-based capabilities influence the effectiveness of open innovation inbound and outbound activities on radical innovation performance. Radical innovation is the pursuit of completely new knowledge and skills in new product/service development that would significantly alter purchasing, delivery or consumption patterns (Slater et al., 2014). For example, Amazon offers radical service innovation, as it uses Internet technologies to renovate its service purchasing and delivery processes with great success. Other examples of radical innovation include electric vehicles, hydrogen fuel-cell-based vehicles, optical fibres, computerized tomography scanners, or smart phones (Varadarajan, 2009). Successful radical innovation can enable a firm to gain competitive advantage, or create new market opportunities (O'Connor and Rice, 2013).

Open innovation (OI) has been touted as an effective driver of producing radical innovation (Gassmann et al., 2010; Huizingh, 2011). OI refers to the use of both inbound (outside-in) and outbound (inside-out) activities to accelerate internal innovation and to expand market opportunities for external use of innovation, respectively (Chesbrough, 2003; Badawy, 2004; West et al., 2014). Inbound activities consist of exploring and integrating external knowledge for technology development and acquisition from external network partners. On the other hand, OI outbound activities include exploiting

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technology capabilities through the commercialization of internally developed ideas or technologies through external channels. The interest in OI has grown substantially in academia and in practice, as witnessed by variously themed conferences, review articles, and special journal issues (e.g., [Badawy, 2004](#); [Huizingh, 2011](#); [West et al., 2014](#)). While early OI studies tended to focus on its effects on new product/service innovativeness and new product/service success (e.g., [Laursen and Salter, 2006](#); [Huizingh, 2011](#)), recent research endeavours begin to emphasize implementing OI activities as a unique resource to enhance radical innovation (e.g., [Parida et al., 2012](#); [Inauen and Schenker-Wicki, 2012](#)).

Despite the strong research interests in OI, the OI literature is somewhat inconclusive regarding the effects of OI inbound and outbound activities on radical innovation. For example, [Gassmann \(2006\)](#) suggests that firms practicing OI inbound activities are more likely to generate cutting-edge ideas leading to radical innovation. This is because opening the firm's boundaries to external inputs enables the firms to facilitate the acquisition of new information for potential changes, and then enhances firms' ability to detect advanced technologies for facilitating radical innovation development. Similarly, [Parida et al. \(2012\)](#) indicate that technology sourcing is linked to radical innovation performance. In contrast, [Laursen and Salter \(2006\)](#) suggest that, although OI inbound activities may stimulate a variety of ideas, without sufficient knowledge sharing efforts those ideas will just touch on shallow surfaces and promote incremental but not radical innovation. Similar conflicting views are also found regarding the effectiveness of OI outbound activities. [Van de Vrande et al. \(2011\)](#) suggest that technology sourcing and sharing within the external network are essential for radical innovation because they facilitate the effective realization of substantial new ideas. Meanwhile, [Hu et al. \(2015\)](#) argues that outbound activities lead firms to keeping their existing organizational routines and technologies, which may hinder their opportunities for acquiring emerging technologies for radical innovation ([Gilbert, 2005](#)).

These inconsistent findings suggest the need for considering additional factors in the OI–radical innovation relationship. Some studies (e.g., [Sabidussi et al., 2014](#); [Cassiman and Valentini, 2015](#)) argue that, in addition OI activities, the ability to recognize, value, obtain, and exploit internal and external knowledge is crucial to innovation performance. Following this line of thought, this study proposes that the efficacy of OI inbound and outbound activities on radical innovation should be assessed, together with firms' knowledge capabilities ([Zheng et al., 2011](#)), especially knowledge acquisition capabilities and knowledge sharing capabilities. Knowledge acquisition capabilities are required because the OI activities are primarily related to acquiring external knowledge and then facilitating the inflow and outflow of knowledge to accelerate radical innovation ([Huizingh, 2011](#); [Parida et al., 2012](#)). In the meantime, the knowledge sharing across boundaries fosters mutual learning, stirs up existing knowledge, and stimulates new ideas for radical innovation ([Boudreau and Lakhani, 2009](#); [Van de Vrande et al., 2011](#)). Knowledge acquisition and knowledge sharing capabilities could complement the inbound and outbound OI activities in a different manner. Therefore, the research objective of this study is to investigate how knowledge acquisition capabilities and knowledge sharing capabilities condition the effects of OI inbound and outbound activities on radical innovation performance. [Fig. 1](#) displays the theoretical relationships of the related variables.

The remainder of this article is organized as follows. The next section presents the theoretical background and hypotheses, followed by the discussion of research methods and statistical results. We conclude with a discussion of the findings and their managerial and research implications.

2. Theoretical background and research hypotheses

This section defines OI and knowledge-based dynamic capabilities in relation to radical innovation performance. Based on the literature, we review possible interactions between two OI activities (inbound and outbound) and two knowledge-based capabilities (acquisition and sharing), and discuss how such interactions affect the performance of radical innovation. Accordingly, six research hypotheses are proposed.

2.1. Open innovation (OI) and radical innovation performance

When Henry Chesbrough coined the term “Open Innovation” (OI) in his 2003 book, he assigned a single term to a collection of ongoing developments, such as not invented here syndrome ([Katz and Allen, 1982](#)), the lead user concept ([Von](#)

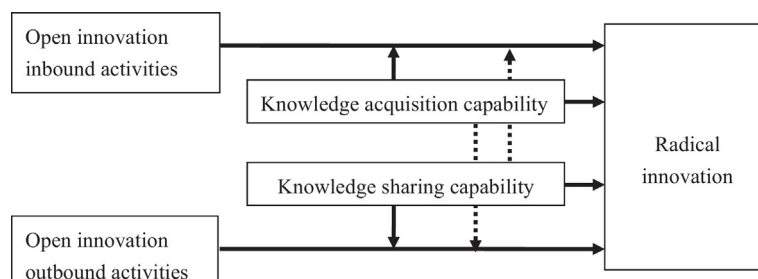


Fig. 1. The theoretical relationships.

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