



The barriers and consequences of radical innovations: Introduction to the issue



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ABSTRACT

This article introduces the special issue on barriers and consequences of radical innovation (RI). Radical innovation, as distinct from more incremental forms of innovation, is increasingly important for organizations and national economies. However, firms face many challenges and barriers (both internal and external) which hinder their RI efforts, and result in significantly higher failure rates for RIs as compared with other forms of innovation. Individually and collectively, the twelve cross-disciplinary articles in this special issue provide a number of important contributions to the extant knowledge base. While most of the contributions focus on barriers, with a concomitant emphasis on enablers, some insights are also offered into the lesser examined area of consequences, particularly the unintended consequences of RI. The editorial concludes by summarizing key issues and presenting provocations for further research.

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1. Introduction

It is well recognized that there are risks and opportunities in the exploitation of radical innovation (RI) and the ability of organizations to respond to or address these risks and opportunities may have a significant impact on their ability to exploit the benefits of RI (O'Connor & Ayers, 2005; Slater, Mohr, & Sengupta, 2014; Story, O'Malley, & Hart, 2011). Given the centrality of RI to the discourse surrounding growth, sustainability, and competitive advantage (c.f. Kim & Mauborgne, 2005; Tellis, Prabhu, & Chandy, 2009), it is surprising that comparatively less attention has been paid to RI than other forms of innovation (in particular, incremental innovation). What is also clear from extant literature is that innovation researchers underpin their research by drawing on and combining diverse theoretical perspectives (Cuevas-Rodríguez, Cabello-Medina, & Carmona-Lavado, 2014), including the resource-based view of the firm (Barney, 1991), core competences theory (Prahalad & Hamel, 1990) and social identity theory (Tajfel & Turner, 1986).

The innovation literature makes a clear distinction between incremental innovations and radical innovations (e.g. Danneels & Kleinschmidt, 2001; Page & Schirr, 2008; Szymanski, Kroff, & Troy, 2007), which are likely to have a much more dramatic effect on the marketplace (Rubera & Kirca, 2012; Srinivasan, Lilien, & Rangaswamy, 2002; Tellis et al., 2009). However, research does not always discriminate clearly between these two (Slater et al., 2014), and this distinction is made more difficult because innovation is generally recognized as a

continuum from incremental revisions through to new-to-the world products (Avlonitis & Salavou, 2007; Tellis et al., 2009). Thus, it is not always simple to actually pinpoint what is, or is not a radical innovation, particularly given the differences in terminology and definitions that abound in the extant literature (see Garcia and Calantone (2002) for a comprehensive review of these definitions). Radicalness can also be seen from a number of dimensions, with many RI definitions focusing on 'radical' in terms of the consequences on the market, while others articulate 'radical' being about departure from the prevailing design norms; the supersession of current technologies (Dosi, 1982). That said, definitions are beginning to coalesce around the notion that an innovation is radical if it has unprecedented improvements in performance features that allow for new application domains to develop (e.g. Colarelli O'Connor & Rice, 2013; Story et al., 2011). This implicitly captures the notion of design norms in that 'unprecedented' improvements tend only to be possible with departures from current design trajectories, which explicitly captures the market-based dimension of RI's consequences.

Efforts to provide a clear definition are important because extant literature points to the fact that developing RI requires different skills and competences than are necessary for more incremental innovation (Holahan, Sullivan, & Markham, 2013; Leifer et al., 2000). Radical forms of innovation differ by virtue of being inherently more risky and complex than other less radical innovations, typically require greater capital investment, and in that they have much more uncertain market responses (Kock, Gemünden, Salomo, & Schultz, 2011; O'Connor & Ayers, 2005). They are also more likely to manifest through business-to-business markets (Griffin et al., 2013). While some work has been done to understand the implications of these key differences, what is

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clear is that there is still some way to go to generate the same sort of improvements in success rates as have been seen for incremental innovations (c.f. Colarelli O'Connor & Rice, 2013) and more research is needed to understand the skills, competences and organizational architectures required to improve success rates for these types of innovation activities. More specifically, addressing the risks and opportunities often requires organizations to overcome barriers and how well they do this may have a significant impact on their ability to exploit the benefits of RI.

The introduction of RIs can also lead to some important, but under-researched consequences (particularly unintended consequences, such as changes in practice, people issues etc.). For example, the British agricultural revolution reduced the labor intensity of food production – meaning there was a supply of labor available to divert into manufacturing and employment in factories. Other consequences are more immediate and even less tangible. These are concerned with internal organizational processes and the way managers and others think about and react to innovations.

A second complication stems from the fact that innovation is, by its very nature, inter-disciplinary (Cuevas-Rodríguez et al., 2014), and while insightful research is being undertaken in a variety of disciplines, – with researchers from such disciplines as engineering, design, economics, sociology, organizational behavior and marketing; there is very little synthesis of this cross-disciplinary research. Therefore, there is a real need to bridge across the different disciplines to open the discourse around the issue of RI if we are to generate a better understanding of the barriers to and consequences of more radical forms of innovation. This could lead to the development of a multidisciplinary research agenda that will ultimately offer a stronger impact upon policy and practice.

This special issue offered a forum for articles exploring issues of significant academic and managerial interest around the barriers and consequences of RI in products, services or business processes. These areas are particularly important for academics, policy makers and management practitioners in understanding how to support/foster RI success and what the ultimate consequences can be when business models change as a result of radical innovations. In doing so, the papers also provided a concomitant emphasis on enablers, with many of the contributions offering insights into the ways companies overcome some typical barriers. In the section that follows, we provide an overview of the papers included in the special issue. We conclude the editorial by summarizing the key issues that stand out from these papers and presenting provocations for further research.

2. Overview of the articles in the special issue

The 12 papers included in this special issue are a mix of invited and competitive papers that explore and articulate various aspects of RI. All papers were subject to peer review. Collectively, these papers offer insights that progress understanding of RI barriers and enablers, and delineate important consequences for the organizations involved. The papers are grouped into three themes based on their primary focus: framing and synthesis; organizational-level barriers and enablers; and process-oriented insights. There are also important connections to be made across these papers, which we highlight within the next section and then draw together to offer insights/provocations for further research.

2.1. Framing and synthesis papers

By interrogating generalizations about RI, essential RI innovation processes and extant knowledge of the barriers to RI, the first three papers generate insights that are significant at the macro level. These include a recognition that 'people' are the key for RI, that dealing with discontinuity is problematic, and that the barriers are less

related to type of novelty but rather size of firm, target market and development processes phases.

Starbuck's invited commentary paper "Five stories that illustrate three generalizations about radical innovations" is a thought piece that draws on five cases to illustrate three major themes underpinning RI – themes that reoccur and are developed in the subsequent papers in this special issue. The first theme is that RI is a discovery process that requires action without full understanding of the consequences of action, adaptability to new information, and the ability to deal with constraints and opportunities as they emerge through the process of innovation. The second is that innovators have to prepare and convince internal and external stakeholders (customers, employees, managers) who cling to existing ways of acting and thinking, that the RIs add value: The third is that social interaction has a profound influence (both positive and negative) on RI. Essentially, social interaction can cut both ways. Embeddedness in networks and social capital may stifle or enable RI – the key is the nature of the social interactions and the climate these interactions engender. Underpinning all three themes are human actions. Starbuck identifies that leaders in particular appear to play an important role in fostering the right actions. Leaders themselves need to be able to adapt: for example through abandoning outdated products, services or processes that they formerly supported; or adapting leadership styles to be hierarchical when crises dictate the exercise of power and egalitarian when subordinates require the psychological safety to challenge the *status quo*.

Bessant, Öberg and Trifilova's invited paper, "Framing problems in radical innovation", examines the barriers and enablers of three essential innovation processes: search, selection and implementation. Incremental and radical innovation are seen as posing very different challenges and requirements for an organization, and so attempting to do both sets up inevitable tensions in relation to the approaches adopted and the structures which bring them about. Rather than attempt to categorize innovations and the strategies that enable them, the authors explore this as contextually embedded, and the challenge being one of 'framing' innovation. This refers to the establishment of the organizational routines necessary to cope with innovation and, in the case of radical innovation, the discontinuities it inevitably promotes. Transitioning to a new mind-set, or *reframing*, is both complex and problematic, especially for the existing incumbents who are inevitably locked into existing cognitive frames (see also Hodgkinson and Healey in this special issue). Drawing on the findings of a major international research program they explore this framing of the environment and related organizational routines as being located within established zones of *exploitation*, *bounded exploration*, *extended exploitation* and *complexity and co-evolution*, each of which demands different structures, tools and enabling routines for search, selection and implementation. While the enablers for exploitation and exploration are well established, fundamental challenges emerge in relation to the establishment of frames for extended exploitation and complexity and co-evolution. Such a perspective sees the essential problem of RI as not about dealing with novelty per se, but of dealing with the discontinuities that emerge by virtue of needing to operate outside of an established cognitive frame (cf. Starbuck's theme of discovery).

Sandberg and Aarikka-Stenroos in their article, "What makes it so difficult? A systematic review on barriers to radical innovation", offer a comprehensive review and classification of RI barriers identified in extant literature. They identify 103 articles focused on RI barriers and classify these into six main barriers, split between external and internal focus. The first internal barrier is a '*restrictive mindset*', which is discussed in Starbuck's and Hodgkinson and Healey's articles. They also identify a '*lack of important innovation competences*': being unable to discover new ideas; difficulties in incubating good ideas; difficulties of moving ideas from the incubation phase to acceleration phase, which is also picked up in Griffin, Price, Vojak and Hoffmann's article, when they discuss '*the valley of death*' and explored in more depth by Aarikka-Stenroos and Lehtimäki in terms of the ability to launch a

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