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Commercializing a radical innovation: Probing the way to the market ☆

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ABSTRACT

Needs, market structures, business models, and relationships concerning radical innovations (RIs) are unpredictable and, consequently, firms face critical challenges in commercialization. Therefore, this study examines the commercialization of RIs as a process complicated by divergent challenges. By drawing on the literature on innovation management, RIs, and the commercialization and adoption of innovations, and by analyzing six longitudinal cases, the study generates its contribution: a dynamic process model for the commercialization of RIs. The model captures the iterative and partially unpredictable commercialization process comprising transits back and forth between three main zones: strategic marketing decision making, market creation and preparation, and sales creation and development. Over this probing process, a firm faces major commercialization challenges: 1) choosing a feasible strategy in conditions of uncertainty, 2) understanding the benefits of innovation from the customer's perspective, 3) creating credibility, 4) acquiring support from stakeholders and the ecosystem, 5) overcoming adoption barriers, and 6) creating sales. For managers, the results suggest diligence in the neglected market creation and preparation zone instead of attempting rushed sales creation.

1. Introduction

Success with a radical innovation (RI) does not often come directly and through wisely predetermined decisions but via a probing process. The technology and market uncertainties typical to RI make the whole innovation process a long-run entity that swings back and forth (Coviello & Joseph, 2012; O'Connor & Rice, 2013b) as firms need to probe how to manage the uncertainties (Lynn, Morone, & Paulson, 1996; O'Connor, Ravichandran, & Robeson, 2008). Hence, the *commercialization* of a radically new product or service can also become cumbersome and prolonged; it is rare for a firm to achieve RI success with the first attempt (Costa, Fontes, & Heitor, 2004; Lynn et al., 1996). For example, in the iconic Post-it Notes case, it took 10 years of struggle and refinement before the firm finally succeeded with the revolutionary and popular sticky notes (see Garud & Karnøe, 2001).

Commercialization conventionally refers to the moment of facing markets and disseminating the innovation (e.g., Crawford & Di Benedetto, 2008; Story, Hart, & O'Malley, 2011). It is a critical area of the innovation process (Chiesa & Frattini, 2011) and crucial to RI success and performance (Schilling, 2005; Song & Montoya-Weiss, 1998). It is often the least well-managed area of the entire innovation process and, therefore, although being technically and functionally superior to competing offerings, most RIs fail (Chiesa & Frattini, 2011; Cooper, 2011; Costa et al., 2004). Even experienced innovator firms seem to blunder in commercialization (Chiesa & Frattini, 2011). Nevertheless, current research still tends to focus more on RI development (e.g., Golder, Shacham, & Mitra, 2009; Veryzer, 2005) and the front end (e.g., Markham, 2013; Reid & de Brentani, 2010 2012), rather than commercialization aspects, i.e., taking the envisioned and developed RI to market. *Therefore, this study aims to analyze the commercialization of RIs as an evolving process over which a firm probes how to commercialize the focal product or service and overcome the critical challenges.* We believe that this topic has both academic and managerial relevance as it facilitates understanding on how to improve RI success. RI refers here to a radically new product or service that changes behavior patterns in the target market (e.g., Chiesa & Frattini, 2011; Story et al., 2011), and creates a line of business that is new to the firm and market (O'Connor, 1998).

Commercialization means marketing an innovation with the aim of converting it into a profit-making position in the marketplace; it entails both marketing strategy planning and subsequent implementation (e.g., Chiesa & Frattini, 2011; Costa et al., 2004). Commercialization also includes launch and market introduction (e.g., Crawford & Di Benedetto, 2008; Hitsch, 2006). Commercialization is often conceptualized as a separate late stage/phase of the innovation process comprising the front end or ideation, technical development, and commercialization (e.g., Koen et al., 2001; O'Connor et al., 2008; Story et al., 2011).

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However, research has increasingly noted that many decisions and activities of the front end, technical development, and commercialization interact and evolve in parallel throughout the RI process (see Prebble, de Wall, & de Groot, 2008; Prenkert, 2012). For example, visioning and early decisions concerning the market and concept made at the front end influence further activities and innovation success (Markham, 2013; Reid & de Brentani, 2012). Hence, we perceive that commercialization and other activities of the innovation process are complementary, concurrent and mutually linked. The commercialization aspect assumingly is lighter at the beginning and grows along the innovation process. We also agree that the aim of commercialization is to disseminate the innovation. In this study, however, we propose that, in contrast to stage approaches, commercialization itself is a process.

We assume that the commercialization process is complicated and shaped by challenges that originate from multiple facets of innovativeness; namely, technology, customer behavior, and marketing (e.g., Costa et al., 2004; McNally, Cavusgil, & Calantone, 2010; Story et al., 2011). Multifaceted innovativeness induces divergent challenges as it generates adoption barriers among customers (Lettl, 2007; O'Connor, 1998; Rogers, 1983) and other stakeholders (Aarikka-Stenroos & Sandberg, 2012; Woodside, 1996), and pushes the firm to face unfamiliar product categories, competitors, distribution channels, and customers (Garcia & Calantone, 2002; Leifer, O'Connor, & Rice, 2001). Furthermore, one strategy assumingly does not fit throughout commercialization, since based on Moore (2002), after the initial introduction to a visionary early market, a firm needs to change its marketing strategy to conquer the conservative early majority market. Only then, typically, are RIs in a position to make a profit, after which commercialization is "sustained" (e.g., Jolly, 1997). However, despite the criticality and extent of the challenges, few efforts to study commercialization-related challenges of RIs have been made (e.g., Chiesa & Frattini, 2011; McDermott & O'Connor, 2002), and have not thoroughly investigated the emergence of divergent challenges along the commercialization process. Thus, our first research question is: *What are the key commercialization challenges in the commercialization process of RIs?* By developing a classification of commercialization challenges, this study contributes much needed clarity on the specific challenges of RIs.

The second question concerns the essence of commercialization per se. Although research has suggested that the commercialization of RIs is more complicated than "just launch", requiring multiple activities and reassessments (Costa et al., 2004; Lynn et al., 1996; O'Connor & Rice, 2013b) and that unsuccessful novel products can later achieve success (e.g., Garud, Gehman, & Kumaraswamy, 2011; Harrison & Waluszewski, 2008), none of the extant investigations focus on the complex process of commercialization. Consequently, extant research offers limited theoretical conceptualization or managerial guidance on the dynamic evolving process by which firms commercialize innovative products. On this basis, our second research question is: *What constitutes the commercialization process for RIs?* By structuring the key process constituents and characteristics of the RI commercialization process and capturing the dynamic processual nature of commercialization, this study contributes to understanding the essence of commercialization.

To achieve our research goals, we chose the theory development approach and through abductive analysis, we piece together the existing theoretical knowledge fragments from the fields of innovation marketing, innovation process, and new product development, and offer empirical insights from six longitudinal cases. Longitudinal analysis is needed to capture the evolution of the commercialization process, but it has been seldom employed with regard to commercialization (e.g., Chiesa & Frattini's, 2011 historical analysis, O'Connor, et al.'s publications from 1998 to 2013). Most frequently, studies relating to commercialization have employed only snapshots of a single point in time to capture commercialization success (e.g., Easingwood, Moxey, & Capleton, 2006). Thus, through the longitudinal approach, we develop a dynamic process model that captures the challenges and the evolution of the commercialization process for RIs, which is our major intended contribution.

The paper is structured as follows: first, we discuss the existing knowledge on challenges, activities, and characteristics along the commercialization process, and then present our research methods. This is followed by case analyses and an examination of the results produced. Finally, we outline the theoretical contribution, as well as the limitations, and offer insights on the management of challenges and the probing approach to the commercialization process.

2. Commercialization process in radical innovations

2.1. Challenges complicating the commercialization process

Since novelty seems to provoke commercialization challenges, we first discuss the facets of innovativeness. *Technological discontinuity* arises from operating in new technological domains and involves new processes or technologies, which might affect commercialization by complicating the design and implementation of products that fit neatly into customers' current consumption patterns (McNally et al., 2010). *Customer discontinuity* refers to required changes in customers' behavior patterns that first increases their perceptions on risk and, second, requires significant learning by customers (McNally et al., 2010). Discontinuities perceived by customers often result in barriers of not knowing and not wanting (Lettl, 2007; O'Connor, 1998) and difficulties in understanding the benefits, which all together create adoption barriers (Rogers, 1983; Veryzer, 1998). According to McNally et al. (2010), *marketing discontinuity* refers to situations in which "firms operate in new marketing domains" with regard to changes in product category, competitors, distribution channels, or customer base. Such a shift requires learning about the new market and acquiring new resources (Costa et al., 2004; Lynn et al., 1996; O'Connor et al., 2008), building a market vision on how to link an innovation's technical features to market opportunities (O'Connor & Veryzer, 2001; Reid & de Brentani, 2012), and creating new markets (O'Connor & Rice, 2013b; Sandberg, 2008). However, the shift also necessitates a change in mindset toward marketing orientation and customer orientation that tends to be difficult, particularly in engineering-based firms (see Jaakkola, Möller, Parviainen, Evanschitzky, & Mulchbacher, 2010; Wiersema, 2013).

Challenges are intensified if the ecosystem and divergent stakeholders (i.e., distributors, experts, regulators, and complementors) do not easily adopt the novelty (Aarikka-Stenroos & Sandberg, 2012; Chiesa & Frattini, 2011; Talke & Hultink, 2010) as they drive customer acceptance or rejection (Aarikka-Stenroos, Sandberg, & Lehtimäki, 2014; Woodside, 1996). Nonetheless, particularly small firms face difficulties in networking with stakeholders (Aarikka-Stenroos & Sandberg, 2012) and developing alliances (Costa et al., 2004). Moreover, the market's conservative nature and, for example, trust sensitiveness of the focal industry (see Sorescu, Chandy, & Prabhu, 2003) may also trigger additional challenges.

2.2. Constituents and characteristics of the commercialization process for RIs

We propose that the commercialization process entails a multitude of linked strategic and tactic marketing *activities* and *decisions*, which we consider *process constituents*. We assume that they can be overlapping, repeated, and accomplished in a variety of orders (see teleological process theory by Van de Ven, 1992). Activities can originate endogenously or exogenously, such as from regulations (see Chiesa & Frattini, 2011; O'Connor & Rice, 2013b). To succeed in commercialization, a firm needs to understand the driving forces that impact innovation success in the specific context (see also Chiesa & Frattini, 2011; Easingwood et al., 2006), and employ that understanding when choosing their activities and decisions.