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Different determinants at different times: B2B adoption of a radical innovation ☆

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ABSTRACT

This research aims to empirically determine which factors best explain business to business adoption of a radical, high-tech innovation early in the diffusion process. Early lifecycle data collection provides insights about the differences in determinants of adoption at different times in the product diffusion process. The results indicate that differences do exist between the determinants of early adoption, intent to adopt later, and unawareness of the innovation. The influencers of earliest adopters appear to be innovation-focused: the perceived benefits of the innovation as well as the strength of the producer network positively relate to early adoption; early adopters also tend to perceive the technology in the innovation as less different than previous technology than do those who intend to adopt later. The influence of a champion within the adopting firm, the ability of the firm to sense and respond to new technology, and the depth of technology knowledge within the adopting firm are significant influencers across multiple stages of diffusion, showing that firm-internal traits are particularly important influencers of adoption. Laggard firms are missing the critical firm traits that lead to information gathering and understanding of innovations. In addition to contributing to adoption research theory and methodology, this research has implications for innovation-marketing and innovation-adopting firms.

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1. Introduction

Firms face a variety of challenges when deciding whether or not to adopt a new product or service. Whether the innovation is new to the world or simply new to the firm, the firm faces a unique multi-phase, multi-person, multi-department and multi-objective purchasing process (Johnston & Lewin, 1996). The process becomes increasingly complex when the innovation incorporates high technology that is radically different from the predecessor. High-tech industries typically exhibit a rapid pace of technological change and a wide array of alternatives (Weiss & Heide, 1993), which makes acquiring knowledge particularly challenging for resource-constrained businesses.

A key question for producers of highly innovative products or services is who to target early in the product lifecycle. How does a producer know which potential customers are most likely to be among the first to adopt a radically new product or service? Do firm attributes, actions, or other factors cause a firm to be more or less likely to buy early in the product lifecycle?

Little research exists on the relationship between innovator-type or innovation-type and adoption. The extant adoption literature also lacks focus on factors that influence adopters at different stages of the diffusion process (Waarts, van Everdingen & van Hillegersberg, 2002). The early timing of this study in the diffusion curve addresses the issue of pro-innovation bias (Rogers, 2003) and captures data from potential adopters as the diffusion is occurring, which creates the possibility to empirically assess differences in the characteristics and perceptions of early adopting firms as compared to firms yet to make the adoption decision.

Previous studies of radical innovation judge the degree of innovation from the producer or expert point of view (e.g. Dewar & Dutton, 1986; Kleinschmidt & Cooper, 1991; Moon, 2010; Veryzer, 1998). While an innovation may be radical from the producer's point of view, the perception among potential adopters of the innovation is relevant in the context of analyzing adoption (Robertson & Gatignon, 1986). This research considers degree of innovation from the potential adopter perspective.

2. Conceptual model

The objective of this research, to find links to early adoption and distinguish among adopters at different stages, leads to the inclusion of a breadth of variables. The decision to adopt is dependent on a range of internal, external, and product factors. The conceptual model, presented in Fig. 1, describes the key influencers of the adoption of a

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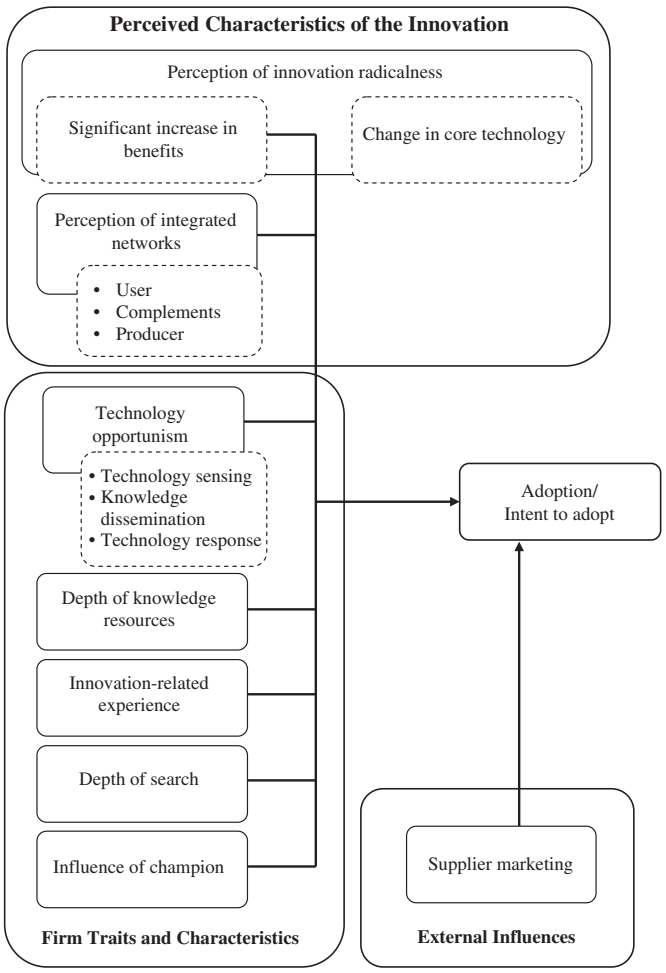

Fig. 1. Theoretical model.

radical innovation. The full list of hypotheses is in Appendix 1. A discussion of each of the variables follows.

2.1. Intent to adopt

Rogers (2003) describes adoption as a decision by an individual or organization to make full use of an innovation. Because of the early timing of this study, intent to adopt is considered in addition to adoption. The theoretical basis behind utilizing intent as a suitable proxy to actual adoption stems from the theory of reasoned action (Fishbein & Ajzen, 1975). The discussion of the remaining constructs relates to their potential impact on adoption/intent to adopt.

2.2. Firm traits and characteristics

Several streams of research point to the important link between information search, absorptive capacity, and adoption. Early adopters of innovations are active information seekers (Lee, Lee & Schumann, 2002). The overt search for information leads to product knowledge (Hirschman, 1980) and a variety of types of knowledge leads to adoption of radical innovations (Dewar & Dutton, 1986). Srinivasan, Lilien and Rangaswamy (2002) synthesize the research in this area to create the *technology opportunism* construct as a firm-level trait that describes a firm's ability to both sense and respond to new technology developments. As a firm trait, technology opportunism does not tie to a particular instance of adoption, but is a systematic approach to accumulating and assimilating information about new opportunities and taking action.

H1–3. A high level of technology sensing (H1), dissemination (H2), and response (H3) positively relate to adoption or the intent to adopt a radical innovation.

Firms with technically capable employees can absorb information about innovations that require a substantial new knowledge component. Dewar and Dutton's study (1986) shows that *depth of knowledge resources* is a predictor of radical innovation adoption. The level of IT knowledge can positively influence adoption specifically for small to medium-sized enterprises (Chau & Jim, 2002). Alternatively, lack of IT expertise in a firm is a barrier to adoption (Lawson, Alcock, Cooper & Burgess, 2003). Based on this evidence, depth of knowledge resources is thought to positively impact radical innovation adoption.

H4. Depth of knowledge resources positively relates to adoption or the intent to adopt a radical innovation.

Previous research shows that a firm's ability to absorb new information is dependent on previous experience relating to that information (Cohen & Levinthal, 1990). Correspondingly, a lack of prior *related experience* significantly increases the need for information search (Weiss & Heide, 1993). Organizations are more likely to adopt a radical innovation when the burden of organization learning lowers due to the knowledge they already have (Fishman and Kemerer, 1997). The relationship between related experience and adoption seems of particular importance in high tech markets, which place a high information processing demand on buyers.

H5. A high level of prior experience related to the radical innovation positively relates to adoption or the intent to adopt.

The overt search for information about a particular innovation is a precursor to adoption of that innovation (Hirschman, 1980). Innovators, in particular, are active information-seekers who utilize all types of communication (Lee et al., 2002). *Depth of search* is the degree to which a firm proactively accumulates information about the particular innovation from a variety of sources.

H6. A high level of depth of search regarding the radical innovation positively relates to adoption or the intent to adopt.

A champion is a "charismatic individual who throws his or her weight behind an innovation" to overcome resistance against the idea within the firm (Rogers, 2003, p. 414). The literature establishes that the *influence of a champion* positively correlates with adoption (Rogers, 2003; Ruppel & Howard, 1998) and is particularly important in the adoption of radical innovations (Day, 1994). The relationship warrants further investigation in a marketing-context, given the potential key role champions play as recipients and disseminators of marketing information.

H7. A high level of influence by a champion positively relates to adoption or the intent to adopt a radical innovation.

2.3. Innovation characteristics

An innovation, even with exceptional performance, generally cannot meet a customer's needs without a range of accompanying products, services, and processes. Moore (1999) argues that providing a whole product increases in importance as the innovation moves from the early market to the mainstream market. The *perception of integrated networks* construct captures the whole product experience in the user network, complements network, and producer network (Frambach, 1993). The user network is important when the utility from consuming a good increases with additional users (Katz & Shapiro, 1985). The complements network includes the products and services that make the central innovation more attractive (Brandenburger & Nalebuff, 1996). Concern and uncertainty about complements increases