J. Eng. Technol. Manage. 35 (2015) 45–70

Contents lists available at ScienceDirect

Journal of Engineering and Technology Management

journal homepage: www.elsevier.com/locate/jengtecman

External environment, the innovating organization, and its individuals: A multilevel model for identifying innovation barriers accounting for social uncertainties

Anne-Karen Hueske, Jan Endrikat, Edeltraud Guenther *

Faculty of Business and Economics, Chair of Environmental Management and Accounting, Technische Universitaet Dresden, Muenchner Platz 1/3, 01062 Dresden, Germany

ARTICLE INFO

JEL classification:
L65
O33

Keywords:
Innovation barriers
Multilevel analysis
Stakeholder
Dynamic capabilities
Biotechnology

ABSTRACT

Minimizing factors (barriers) disrupting innovation is a key to success. Drawing on stakeholder theory and dynamic capabilities, we propose the EOI barrier model for identifying barriers at multiple levels of analysis: the external environment (external stakeholders), the organization (managerial levers based on dynamic capabilities) and the individual (employees' attitudes and abilities, management commitment). By applying this model to the German biotechnology industry, we examine how barriers manifest themselves in specific settings and demonstrate the context specificity of barriers. Using interview data, we identify 39 barriers across the three levels of analysis. The findings highlight the importance of secondary stakeholders.

Introduction

Organizations must innovate to gain and sustain competitive advantage, either by influencing their environment or by responding to changing organizational and environmental demands (e.g., Baregheh et al., 2009; Bessant et al., 2005; Damanpour, 1991; Zain et al., 2002). While research aimed toward an understanding of successful innovations in firms has increased over time (Anderson et al., 2004;

* Corresponding author.
E-mail addresses: anne-karen.hueske@tu-dresden.de (A.-K. Hueske), jan.endrikat@tu-dresden.de (J. Endrikat), ema@mailbox.tu-dresden.de (E. Guenther).

http://dx.doi.org/10.1016/j.jengtecman.2014.10.001
0923-4748/

Verhees and Meulenberg, 2004), increasingly more factors that hamper innovation have also been mentioned (Mirow et al., 2007). Although the value of revealing key factors that may explain how innovation can be managed (e.g., success factors) is not denied, the ability to learn from failures and detours is critical to progress (Pisano, 2006). The minimization of disruptions to innovation is actually regarded as a "key to innovative success" (Hall and Martin, 2005). Indeed, some authors even argue that learning from mistakes motivates learning more than success (Eisenhardt and Martin, 2000). Consequently, this study follows this approach of addressing the "innovation problem" (Storey, 2000, p. 348) by conveying an innovation barrier perspective.

Barriers to innovation are factors that impede, delay, or completely block innovation (Mirow et al., 2007, 2008). Complementary to success factor research, which aims to reinforce positive factors, innovation barrier research aims to (re-)establish the flow of innovation by revealing, understanding, and overcoming barriers to innovation (Hadjimanolis, 1999). The uncovering of barriers refers "to the firm's awareness of the difficulties involved as a result of engagement in innovation activities" (D'Este et al., 2012, p. 482) and is indispensable to an understanding of the innovation process in organizations and the ability to overcome the barriers (Cooper, 1998; OECD and Eurostat, 2005). Therefore, a comprehensive framework encompassing all possible barriers would enhance the identification of innovation barriers and thereby increase our understanding of innovation.

Moreover, since "innovation has been studied at the level of the industry, the firm, or the individual" (Damanpour, 1996, p. 694), there is a call for "integrative models that capture and clarify the multi-determined, multilevel phenomenon of innovation implementation" (Klein and Sorra, 1996, p. 1056). Given that "organizations are multilevel systems" (Klein and Kozlowski, 2000a, p. 3), it becomes apparent that innovation within organizations is influenced by factors at the environmental, organizational, and individual levels (Damanpour, 1991, 1996; Damanpour and Schneider, 2006). Consequently, a valid and meaningful examination of barriers to innovation must take into account those three levels of analysis.

Innovation processes are characterized by the involvement of many actors with difficult-to-reconcile stakes and a multiplicity of interactions (Afuah and Bahram, 1995; Hadjimanolis, 2003) from which potential barriers may arise. For example, technological, commercial, organizational, and social uncertainties are barriers to be overcome for successful innovation according to a framework addressing radical, controversial innovation, the so-called TCOS model (Hall and Martin, 2005; Hall et al., 2011). These uncertainties parallel the technological, competitive, regulatory, and social challenges emerging from a changing environment, which are addressed by the dynamic capabilities view (Barreto, 2010). Dynamic capabilities describe the "capacity of an organization to purposefully create, extend, or modify its resource base" (Helfat et al., 2007, p. 4). In reference to dynamic capabilities, one could argue that a lack of dynamic capabilities manifests itself as barriers to innovation at the organizational level.

While the TCOS model focuses on the technological, commercial, organizational, and social uncertainties that an innovation is confronted with, dynamic capabilities relate to change inside the organization implemented as a response to the external environment and to maintain competitive advantage (Barreto, 2010). However, neither the TCOS model nor the dynamic capabilities view address the individual member of the organization and which barriers are related to this level of analysis. As "organizations do not behave, [but] people do" (Klein and Kozlowski, 2000b, p. 7), the individual level must also be addressed when analyzing innovations. Reviewing the literature, one finds a positive and a negative approach in research on individuals and innovation: The discussion on entrepreneurship, champions of innovation, and their personality traits (e.g., Antoncic and Hisrich, 2003; Lefebvre and Lefebvre, 1992; O'Connor and McDermott, 2004; Sharma and Chrisman, 2007; Williamson et al., 2013) is complemented by research on individuals who resist innovation (e.g., Chung, 1996; del Val Pardo and Fuentes, 2003; Ford et al., 2002). Individuals influence innovation with their abilities and attitudes (Anderson et al., 2004).

Responding to the urgent calls for multilevel approaches in innovation research (Anderson et al., 2004; Crossan and Apaydin, 2010; Klein and Sorra, 1996), we develop a multilevel model for identifying and revealing manifestations of barriers to innovation. The proposed EOI barrier model (external environment organization individual barrier model) structures innovation barriers at three levels of analysis: the external environment, the organization, and the individual. Referring to