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Technovation

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

Meta-organizing for open innovation under environmental and social pressures in the oil industry

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ARTICLE INFO

Keywords:

Open innovation model
Innovation intermediaries
Meta-organization
Sustainable development
Institutional theory
Resource-based industry
Oil industry

ABSTRACT

Scholars have yet to address *why* and *how* open innovation model can be applied effectively within industries while diminishing its potential cost and challenges. In this paper, we extend open innovation model both theoretically and practically by identifying a) the boundary conditions that motivate firms within resource-based industries to apply the model and b) the approaches that have been implemented in practice in applying the model. In this multiple-case study, we explore *why* and *how* firms within the upstream Canadian oil industry have evolved to apply open innovation model over time to deal with the industry's challenges. First, our findings show that institutional forces, both normative and coercive—such as social and environmental pressures, were the primary drivers for adopting open innovation. Second, by building on the taxonomy of meta-organizations, we demonstrate that an industry-founded and not-for-profit innovation intermediary, as a meta-organization, is a necessary tool to address problems of adopting open innovation. We argue that the experiments of the upstream oil industry to develop a suitable organizational design for such innovation intermediaries suggest that a moderate level of stratification accompanying either close or open membership is the most suitable design. The findings from this study can be helpful to other industries, particularly other resource-based industries, which seek to effectively employ the open innovation model through innovation intermediaries.

1. Introduction

Since Chesbrough (2003) introduced the 'open innovation' model, the idea has attracted significant attention from both practitioners across industries and business scholars (Chesbrough and Crowther, 2006; Christensen et al., 2005; Dittrich and Duysters, 2007; Gassmann and Enkel, 2004; Harison and Koski, 2010; Parida et al., 2012). The open innovation model has challenged some of the traditional protective practices in innovation management, such as ownership of intellectual property over the entire cycle of innovation (also known as the closed innovation model) to enjoy its full rent (Teece, 1984), and has encouraged collaboration (Chesbrough, 2003). Although there are benefits and costs to both closed and open innovation strategies, research has yet to determine which is preferable, given the context of the industry.

To address the tension between the costs (e.g., adopting external innovations, controlling intellectual property (IP) and finding appropriate partner(s)) and the benefits (e.g., sharing resources, cost, and risk) of the open innovation model, two questions need to be addressed. First, *why* do firms within an industry collectively apply

the open innovation model? Second, *how* can firms within an industry collectively apply the model to enjoy its benefits while minimizing its costs and challenges?

By using multiple case studies to investigate the upstream Canadian oil industry, a resource-based and a process-oriented industry (Stadler, 2011), we first explore *why* the upstream oil industry would adopt the open innovation model. Using institutional theory as a framework, we argue that normative and coercive forces are the primary drivers for adopting the open innovation model to respond to the social and environmental concerns faced by the industry. Second, we investigate *how* the upstream oil industry has evolved its practices to benefit from open innovation while simultaneously dealing with its challenges. By studying the development of the Canadian oil industry's innovation intermediaries in the past two decades, we show that the industry has converged on the idea of an industry-founded and not-for-profit innovation intermediary, with a moderate level of stratification and either closed or open membership (i.e., the extended enterprise and the managed ecosystem designs (Gulati et al., 2012)), as the best approach to open innovation. Innovation intermediaries, as a form of meta-organizations, facilitate the process of identifying, accessing, and

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<http://dx.doi.org/10.1016/j.technovation.2017.01.002>

Received 4 December 2015; Received in revised form 20 June 2016; Accepted 3 January 2017
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transferring solutions to problems (Howells, 2006; Sieg et al., 2010; Spithoven et al., 2011).

This paper contributes to the innovation literature by tackling two key issues. First, we examined *why* and *how* the majority of firms within an industry choose to adopt open innovation, given the associated cost and risks. Second, we introduce institutional theory as a theoretical framework to identify the boundary conditions of when industries might apply open innovation. Third, we respond to (Gulati et al., 2012) call to map meta-organizations in a particular context and to explain what conditions support the various designs of meta-organizations. Finally, we argue that the lessons learned from the experiments of the oil industry can be helpful to other resource-based industries (such as the mining, forestry and fishing industries) that seek to effectively employ the open innovation model and innovation intermediaries to address social and environmental challenges.

2. Literature review

2.1. The open innovation model, innovation intermediaries and meta-organizations

The open innovation model is defined as “... the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for the external use of innovation, respectively (Chesbrough, 2003, P. 2)”. In other words, the literature on open innovation argues that the boundaries of the focal firm should become more porous to allow innovative ideas to move between its inside and outside (Chesbrough, 2006). Chesbrough (2003, 2006) argues that the 21st century is “the era of open innovation” for three main reasons. First, there is high mobility and availability of knowledge workers or skilled workers. Second, the capability of external suppliers to provide technologies and capital has increased dramatically. Last, private venture capital for starting a business based on innovative ideas is more accessible than before. In addition to these factors, utilizing the open innovation model creates some advantages, including minimizing risk, reducing R & D costs, and accessing technical and non-technical resources not held by the focal firm (Holmes and Smart, 2009; West and Bogers, 2013). Given these factors and advantages, firms are opening up their boundaries and collaborating with suppliers, competitors, and customers in the process of innovation to stay competitive and survive in the market (Gulati et al., 2012).

Besides the various advantages of collaboration through open innovation, there are significant challenges in actively managing the process, including identifying the external valuable resources and adopting external innovations into the focal firm (Chesbrough and Crowther, 2006; Dodgson et al., 2006; Jeppesen and Lakhani, 2010; Katz and Allen, 1982; Laursen and Salter, 2006; Piller and Walcher, 2006; Van de Vrande et al., 2009). This is referred to colloquially in the industry as the “Not Invented Here” syndrome. The degree of these challenges depends on the degree of the absorptive capacity (AC) of a firm (Cohen and Levinthal, 1990; Zahra and George, 2002). AC is defined as the capacity “of acquiring external knowledge and assimilating this knowledge by means of incorporating it into the firm's knowledge base” (Lichtenthaler and Lichtenthaler, 2009).

One possible reason for insufficient AC is the low level of affinity for collaboration between firms, which stems from a lack of collaboration experience and a lack of an efficient network within the industry (Barney, 2001). Brown (1991) and Westley and Vredenburg (1991) introduced the concept of the strategic bridging organization to address low levels of absorptive capacity caused by a lack of networking ability. Strategic bridging organizations bring together all the players, including private firms, multinational corporations, NGOs, and government agencies, to collaborate on a project. A strategic bridging organization acts as a third-party stakeholder and “enters collaborative negotiations to further their own ends as well as serve as links among domain stakeholders” (Westley and Vredenburg, 1991, p. 68). Strategic brid-

ging organizations are able to crystalize the problem domain and to facilitate the process of collaboration where in the past there existed mistrust, social, cultural and political problems (Sharma et al., 1994).

The strategic bridging concept was subsequently adopted to explicitly facilitate open innovation. Howells (2006), Gassman et al. (2010), Sieg et al. (2010), and Spithoven et al. (2011) use the term “innovation intermediary” to describe a strategic bridging organization in the open innovation context. An innovation intermediary is “an organization or body that acts as an agent or broker in [some] aspect of the innovation process between two or more parties” (Howells, 2006, p. 720). Innovation intermediaries such as Nine Sigma and InnoCentive, open innovation service providers, investigate multiple markets and technology domains to connect innovation seekers and providers. As a result of their network building, knowledge can flow from where it exists to where it does not (Garcia and Vredenburg, 2003). Although innovation intermediaries facilitate the process of open innovation, there are significant challenges to how their organizational structure should be designed to create an effective network among agents and to provide innovative solutions to existing problems (Sieg et al., 2010; Westley and Vredenburg, 1997). Meta-organizational design may help to address these challenges.

Innovation intermediaries are a form of meta-organization (Gulati et al., 2012). Meta-organizations “comprise networks of firms or individuals not bound by authority based on employment relationships, but characterized by a system level goal” (Gulati et al., 2012, p 573), or a ‘domain level goal’ (Westley and Vredenburg, 1997). These organizations are defined by two dimensions: permeability of boundaries and degree of stratification (Gulati et al., 2012). The first dimension, permeability of boundaries/membership, addresses the structure around the membership of these organizations, including how an agent can become a member, how long an agent can stay on board as a member, and the exclusivity of the membership. The second dimension, stratification, concerns the extent to which the decision making process follows a formal hierarchical and traditional organizational design.

According to these two dimensions, Gulati et al. (2012) categorized meta-organizations into four types; a) *Closed community* organizations that have closed boundaries and low stratification (i.e., less hierarchical decision making), such as technical standards committees of industries, b) *Open community* organizations that have open boundaries and low stratification, such as Wikipedia, c) *Extended enterprise* organizations that have closed boundaries and high stratification (i.e., high hierarchical decision making) such as franchising networks, and d) *Managed ecosystem* organizations that have open boundaries and high stratification, such as the Android operating system. Table 1 shows Gulati's taxonomy of meta organizations.

2.2. Neo-Institutional theory

Institutional theory highlights the role of social concerns, legitimacy, and the cultural environment of organizations in their adoption of certain practices, as opposed to profit maximization (Selznick, 1994, 1996). In other words, institutional theory aims to explain *how* and *why* firms adopt similar strategies under certain institutional pressures (DiMaggio and Powell, 1983). Neo-institutional theory introduces three types of institutional isomorphism: coercive, mimetic, and normative (DiMaggio and Powell, 1983). Coercive isomorphism occurs when firms face formal and informal pressures from organizations on

Table 1
Meta-organization taxonomy regenerated from (Gulati et al., 2012).

	Low stratification	High stratification
Closed boundaries	<i>Closed community</i>	<i>Extended enterprise</i>
Open boundaries	<i>Open community</i>	<i>Managed ecosystem</i>

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