Sensing opportunities: is there a need for a managed search process in open innovation?

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Abstract

This paper attempts to better understand how firms can improve their open innovation capabilities. Specifically this paper focuses on the process of external searching. An in-depth literature review, combined with workshops with companies from the oil and gas sector lead the authors to conclude that firms can improve their innovation performance by having a defined and managed process for their core open innovation activities. Our research shows evidence of open innovation activity, but points to a lack of managed searching processes.

Keywords: Open innovation, search, performance

Purpose

Knowledge is regarded as a significant component of an organisation's armoury (Teece, 1998), and the source of technological innovativeness (Rosenzweig and Mazursky, 2014). Determining the source of that knowledge is increasingly important for organisations with expertise dispersed across geographical boundaries (Herstad et al., 2014). Moreover, organisations are equally required to keep abreast of technological and other market developments occurring outside of their own business (Kristal et al., 2010). For firms engaged in the practice of open innovation, external searching is considered to be a core activity (Laursen and Salter, 2006). Using an open innovation (Chesbrough, 2003) lens, this paper will seek to investigate the processes adopted by firms when searching the external environment for new technological developments and knowledge.

Gassmann et al. (2010) indicated that firms are interested in professionalising their open innovation activities. This work addresses the managerial problem of how to organise a firm internally to ensure the effective execution of open innovation, specifically focusing on the external search process. To do this, we examine firms who have shown openness in their operations (Dahlander and Gann, 2010) through evidence of activity in one or more modes of open innovation (Bianchi et al., 2011; Kang and

Kang, 2014). The primary objective for this investigation is to better understand how firms engage in one of the core activities associated with open innovation.

As advocated by Chesbrough (2007), companies must actively search for and exploit external ideas. Environmental scanning covers one aspect of this whereby managers monitor and respond to changes in the external environment (Hambrick, 1981; Bititci et al., 2008). However, our interest lies in the processes firms adopt when searching the external environment with the intention of leveraging that knowledge for commercial gain. Our literature review would suggest the following levels of maturity, as shown in the table below.

Theme	External searching maturity (BASIC)	References
Innovation environment	Innovation is strictly an internal activity	(Chandler, 1990; Chesbrough, 2003; Dahlander and Gann, 2010)
	Predominately searching for ideas internally with limited search of the external environment	(Katila and Ahuja, 2002; Bessant and Tidd, 2008)
	An opinion that external knowledge is unwanted within the firm	(Katz and Allen, 1982; Burcharth et al., 2014)
	If external searching occurs individuals will look in industries similar to their own (local, narrow search)	(Bessant and Tidd, 2008)
	Looking in unfamiliar, distant, and unrelated industries for new technological developments and knowledge is not common practice	(Nelson and Winter, 1982; March, 1991; Chiang and Hung, 2010; Chang et al., 2012)
Business processes/ routines	No systematic process for external searching	(CIM-OSA, 1989; Childe et al., 1994; Chesbrough and Crowther, 2006; Rohrbeck, 2010; Bititci et al., 2011)
Individual roles	Searching is done by a few individuals, but there is no official assigned roles to perform this task	(Rohrbeck, 2010; Whelan et al., 2011)
	No champions or managerial encouragement to promote external searching	(Schön, 1963; Chakrabarti, 1974; Fichter, 2009; Enkel et al., 2011)
Performance measurement	No performance measurement of the search process	(Gassmann et al., 2010; Antony, 2011)
Theme	**External searching maturity (INTERMEDIATE)**	**References**
Innovation environment	A more open approach to innovation whereby the firm uses both internal and external knowledge	(Freeman, 1991; Chesbrough, 2003; Chesbrough, 2006; Inauen and Schenker-Wicki, 2011; Robertson et al., 2012)
	Individuals search their core industrial area as well as beyond their immediate business periphery	(Nelson and Winter, 1982; Laursen and Salter, 2006; West and Gallagher, 2006; Bessant and Tidd, 2008)
	Emphasis on looking in unfamiliar places	(Teece, 2007; Bessant and Tidd, 2008)
	Employees make considered effort to gather knowledge from suppliers, universities, research institutes, clients, competitors, and other nations	(von Hippel, 1988; Li and Vanhaverbeke, 2009; Buganza et al., 2011)
	A mixture of exploratory and exploitive search intentions	(March, 1991; Mudambi and Swift, 2014)
	Establishment of an internal system on intranet to leverage internal knowledge	(MacKinven, 2014)
Business processes/ routines	The firm establishes policies and documents a defined process for external searching	(Paulk et al., 1993; Winter, 2003; Chesbrough and Crowther, 2006; Asakawa et al., 2010; Sofka and Grimpe, 2010)
	Process-mapping exercise to establish ways of improving current search process	(Slack et al., 2010; Modig and Ahlstrom, 2012)
	Introduction of software to aid the search process	(Dodgson et al., 2006; Van de Vrande et al., 2006)
Individual roles	Management encourage the act of searching externally for specialised	(Enkel et al., 2011; Bigliardi et al., 2012)

	technology and knowledge	
	Management monitor the search process	(Paulk et al., 1993; Chenhall and Langfield-Smith, 2007)
	Introduction of champions for searching the external environment	(Schön, 1963; Chesbrough and Crowther, 2006; Fichter, 2009)
	Individuals have assigned roles for searching (Technology Scouts)	(Dodgson et al., 2006; Chiaroni et al., 2010; Rohrbeck, 2010)
	Opening up and building relationships with externals - a combination of strong and weak ties	(Granovetter, 1973; March, 1991; Dittrich and Duysters, 2007; Bianchi et al., 2011)
Performance measurement	Identified opportunities are analysed and evaluated	(Marshak, 1993; Ili et al., 2010; Berchicci, 2013)
Theme	**External searching maturity (ADVANCED)**	**References**
Innovation environment	A dedicated focus on external knowledge	(Dahlander and Gann, 2010)
	The importance of external searching incorporated into the firm's innovation strategy (organisational change)	(Meyer and Rowan, 1977; Deal and Kennedy, 1982; Ates and Bititci, 2011; Enkel et al., 2011; Kindström et al., 2013)
	The importance of external searching communicated through corporate communications	(Katz and Allen, 1982; Chiaroni et al., 2010)
	Organisational buy-in (culture) to bringing in external ideas	(Kumar et al., 2011; Kaushik et al., 2012)
	Employees are aware of the company's focus on bringing in external ideas to complement internal technology developments	(Dodgson et al., 2006; Huston and Sakkab, 2006; Mortara and Minshall, 2011)
	Establishment of independent open innovation business units	(Kirschbaum, 2005)
	Development of an internal system to leverage both internal and external ideas (online platform)	(Piller and Walcher, 2006; Ili et al., 2010; MacKinven, 2014)
	Success stories of previous collaborations communicated	(Paulk et al., 1993; Chesbrough and Crowther, 2006)
Business processes/ routines	Document improved process-map, communicate, and continuous improvement of the process	(Paulk et al., 1993; Slack et al., 2010; Modig and Ahlstrom, 2012)
	Best practices for searching are shared across the firm	(Hughes and Wareham, 2010)
	Management of internal open innovation system	(MacKinven, 2014)
Individual roles	Management physically engage in the strategy of bringing in external ideas in	(Enkel et al., 2011)
Performance measurement	Awareness that over-searching can have negative consequences on innovation performance	(Laursen and Salter, 2006; Chen et al., 2011; Li-Ying et al., 2014)
	Continuous improvement of the search process whereby individuals can offer suggestions for improvement	(Paulk et al., 1993)

Table 1: External searching maturity for open innovation

Design/methodology/approach

The objective of this research was to look for evidence of managed open innovation activity. For this, we adopt a concurrent triangulation design. This involves the simultaneous collection of both quantitative and qualitative data during the same collection period i.e. an Innovation Workshop (Creswell et al., 2003). We use the framework in MacKinven et al. (2013) to explore open innovation activity using a deductive based open innovation maturity model. During a series of workshops involving two global oil and gas companies, we collect qualitative data centred on how the firm searches for knowledge and technology. Participants also provide numerical data against a scale ranging from basic (1, 2, 3), intermediate (4, 5, 6), or advanced (7, 8, 9) to provide a maturity assessment on the search activity. Individuals attending the workshops included: Managing Director, Technical Manager, Commercial Manager, Technology Manager, R&D Manager, Engineering Excellence Manager and a Technology Analyst. Sessions lasted between 1 ½ and 2 ½ hours.

Each workshop followed the guidelines from the case study protocol that was developed prior to data collection. All workshops were recorded and transcribed verbatim. Data was subsequently arranged into explanatory effect matrixes by categories of sensing, seizing, and transforming. Following this, the data was uploaded onto NVivo 10 software and coded. For construct validation, we interviewed participants directly involved in the innovation process, and will provide key contacts with a case study report. In terms of internal validity, we seek to establish patterns emerging from the empirical data. Also, to improve external validity we use repetition logic through multiple-case analysis. As recommended by Yin (2003), the case study protocol and case database tests for reliability.

Findings

Analysis of the case study data shows varying levels of maturity for external searching between the two firms. Typically, the starting point of any search process is initiated by the realisation that the firm has a problem and needs to identify a solution. From the behavioural theory of the firm, this is termed problemistic search (Cyert and March, 1963). Pipeline Co. recognised the need for improved technical capability, and the option for a technical partnership came from a SWOT analysis. The Managing Director saw this situation working in motorsport and felt a similar approach would be suitable for Pipeline Co. This reflects Bessant and Tidd's (2008) emphasis on looking for ideas outside of the firm's operating industry. At a company level, the R&D Manager from Pipeline Co. stated that, *"(innovation) comes out of your people, taking people from different backgrounds. We don't take people from different backgrounds, we take people from pipeline welding."* This comment gives an insight into the firm's position on sourcing knowledge. This is reinforced by the Technology Manager's comments, *"it's not as if we've gone to the car industry to see what we can take on board."* Instead, Pipeline Co. work closely with their clients to establish technology requirements, and they also collaborate with key suppliers, reflecting the types of knowledge sources cited in the literature (von Hippel, 1988; Rothwell, 1992). Additionally, the Technology Manager confirmed that, *"these are things we do, there is no formal process…it's fairly evident, I think you can see we don't have a process map…maybe we should have."*

In contrast, Valve Co. are more in the mind-set of open innovation. Their Oil & Gas Innovation Team are interested to set-up an online system to help their engineers gain access to specialised knowledge internally. Moreover, they are considering the possibility of piloting external technology challenges, an option mentioned in Piller and Walcher (2006). In addition to this, they have a dedicated Technology Analyst at their

headquarters who is tasked with identifying technologies or companies that Valve Co. could use to help solve problems, a role advocated by Rohrbeck (2010) and Whelan et al. (2011). Direction for this task is delivered from the Engineering Directors who will communicate that the firm is interested in a particular area, and the Technology Analyst will be responsible for providing a number of potential solutions. In order to do this, a software programme is used to screen companies based on their description, what technology they use, and their operating industry. Identified solutions will then be communicated back to the Engineering Directors for assessment. If there are no existing technologies, Valve Co. have other development options: (1) initiate an R&D programme at their Research Centre, or (2) begin a partnership with a university. Another mode of open innovation that this company has heavily drawn from is acquisitions. The challenge Valve Co. has is co-ordinating and accessing this newly acquired knowledge on a group-wide basis.

Despite there being evidence of Valve Co. enacting various modes of open innovation as referenced in Chesbrough (2006) and Bianchi et al. (2011), they too do not have a defined process for external searching. According to the Technology Analyst, *"external searching – that's my role, but it's not a systematic process. It's really just what I choose to do is the process."*

The section above characterises some of the features that might exist within a firm who may appear to be engaging in open innovation because of observed open innovation activity. However, this may have been: (1) disguised as open innovation by firms communicating they do open innovation despite no evidence of internal organisational transformation to reflect its adoption, (2) open innovation has not been incorporated into strategy acting as the firm's operating business model (MacKinven et al., 2014), or (3) due to observed open innovation activity, academics cite the firm as doing open innovation without asking how the firm has re-structured itself through a change in culture, business processes, individual roles, and performance measurement of core open innovation activities (MacKinven et al., 2014).

Relevance/contribution

This paper contributes to the research thread in the literature on external searching started by Nelson and Winter (1982) and more recently by Laursen and Salter (2006) and Troilo et al. (2014). For this, we have developed a deductive based maturity model for a core open innovation activity and tested it in two global oil and gas firms. We find that, despite the appearance of open innovation activity from the outside, there is a distinct lack of evidence internally to suggest that the firms are strategically operating under this paradigm.

Conclusion

For internal R&D, having a formalised and well-structured product development process is widely agreed as best practice (Cooper et al., 2004; Kahn et al., 2006). Therefore, as open innovation is being communicated as the new imperative for creating and profiting from technology (Chesbrough, 2003), why should open innovation activities not be managed through a defined process? Gassmann et al. (2010) argues that firms want to professionalise their open innovation activities. We propose that firms are able to become better at open innovation by first understanding what the concept is, and also defining and managing its core processes – one activity being external searching. Further research is required to explore how search activities differ from firms who have introduced open innovation as strategy compared to those who have not.

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